Volcanology

ah competition). J. Geophys. Res., D. Paper 400262

8699 Volcenology (Calderas) FERALKALINE ASE-FLOY THES AND CALDERAS OF THE HORSMITT VOLCANIC FIELD, SOUTHEAST GREGOR AND

are coundities. The ash-flow field overties a likm-thick serion of Microns Steens volcanic series
and Steens Beauti, Indicating a minisus age of 16.1
Na for the Steens Sesait. The Graveds rift, a 200km-long MF-atthing structure, developed just prior
to suspicion of the safet lawss. Each emb-flow sheat
resulted in the foreation of a large collapse
calders along the Braveds rift. The center of the
volcamic field is dominated by four overlapping and
nested calderses, smallict to these are three
additional calderse. The areas adjacent to the
incipient calderse schilded during ash-flow
eruption. Thickening of the sah-flow sheats,
smacelinal warping outside the calders ring fault,
and tilling in toward the calders of blocks bounded
by curvilineer leaks all indicate ragional
subsidence prior to calders collapse. The McDarwitz
calders complex is highly minutalized; it contains
over deposite of lig. 5b, Cc., Li, and U. The
peralsaline tuffs here high contents of these
slesses to sake the source focks from which metals
were heached by hydrotherman spaces and were the source focks from which metals
were leached by therotherman spaces and were the source focks from which metals
were leached by Derotherman spaces and were the source focks from which metals
were leached by Derotherman spaces and were the source focks from which metals
were leached by Derotherman spaces and were of caldere-relaced
with the contents of caldere-relaced
with the calders of caldere and the contents of the caldere of the caldere

Properties of the Early Olicocepy Sounday Calders, Stouthfon of the Early Olicocepy Sounday Calders, Modulaton of the Early Olicocepy Sounday Calders, Modulaton of the Early Olicocepy Sounday Calders, Modulaton Fill, Colorado F. J. Verga and R. M. Smith (Chico oil Research Center, P.O. Est Pa, Bras, Calif., 92521)

The 1th Name of Sounday Calif., 92521)

The 1th Name of Sounday Calif., 92521)

The 1th Name of Sounday Calif., 92521

The 1th Name of Calif. In Colorador Calif.

Name of Rayley Anderica oil radially autuard, suggesting that the Romants calders formed mean the callers of large composite volume. The ogleter callers formed mean transfer of large composite volume. The ogleter of the Sounday of the Sounday of August of Callers of August Callers (Sounday of Callers of Callers (Sounday of Callers of Callers (Sounday of Callers of Callers (Sounday of Callers (Sounday of Callers of Callers (Sounday of Callers (Sounda

8699 Volcanology (Calderse) LOCATION AND CONTIGURATION OF MAGMA RODILS BENEATH LONG VALLEY, CALIFORNIA, DETERMINED FROM AECMALOUM FARTHQUAFE. SIGNALR

LOCATION AND CONFIGURATION OF MAGNA RODIES BENEATH 10M:
VALLEY, CALIFORNIA, DETERRIBED FROM AROMALOUS FARTHUMAY.
SIGNALS
Chris D. Sandare (Seismological Laboratory, Mackey School of Hines, University of Navada, Rone, Novada 39557)
Recordings of 261 small earthquakes which occurred terministic plant in the caldra depths from 1 to 15 he are used to may be subsurface geometry of shear-wave attenuating bodies in the caldra agrossity of thems events recorded northwat, morth, northwest, and must of Long Valley with ray paths through have very structured have very low amplitudes, and high frequency P— and B—wave enarty is entswing for the same station—went combinations. The volcanic and geothermal history of the S—save anarys of the same station—went combinations. The volcanic and geothermal history of the S—save anarys of the same station—went combinations. The volcanic and geothermal history of the S—save anarys of the same station—went combinations. The volcanic and geothermal history of the S—save anarys of the same station—went combinations. The volcanic and geothermal history of the S—save anarys of the same analysis of the same station—went combinations. The volcanic and geothermal history of the S—save anarys of the same station—went combinations. The volcanic and geothermal history of the S—save anarys of the same station—went combinations. The volcanic and specific and secondary arrivals again or manifer the surface of the surface and beneath the surface and probably consect beneath the surface of the valley may be related to asgam location at depth.

J. Geophys. Res.; 2, Paper about 12

Geophys. Res.; 3, Paper about 12

Geophys. Res.; 3, Paper about 21

Geophys. Res.; 3, P

CALDEM VOLCAMOES OF THE TAUPO VOLCAMIC AURE, new ZERIANO, C.J.M. Wilson (Geology Dapt., Auckland University) Private Beg., Auckland, Hew Zealend, A.M. Rogan, I.E.M. Suith, O.J. Morthey, I.A. Naira, and B.F. Houghton The Taupo Volcamic Zone, (TVZ) has been active since 2Ma and has erupted sid? (um of designally rhyoffite mages during the last invition years. Most of this volcamism is concentrated in a 125. a 80km area forming the central YZZ and is expressed largely as six; major calders valcamos; Mostring, (Extein, Expense).

March 27, 1981

Annyal han, Marcan and Jaupu, marbod by localised collapses of the underlying bareacht and cluster; it room to inferred went sites. Those centres has activity spans from 14th to floths and have each small spans from 14th to floths and have each small test along to 1600 miles of the same at least 10th to 1600 miles of the same and the second state of the same are the same as a least the same are the same and the same are the same a

lews

Ţ

## **Dechlorination**

Decidorination is a waste water treatment process used by water treatment plants and power plants as a measure to meet "...increasingly stringent discharge limitations." (Environ. Sci. Technol., 18, 48A-55A, 1984). Chlorination is used to kill bacteria and to reduce algae in waste water, but chlorine-rich waters discharged from the treatment and power plants can kill fish and wildlife as well. mages to the marine ecosystem as the result of chlorination were focused upon in a series of studies 2 years ago (Environ. Sci. Technol., 16, 15A-18A, 1982). Now, as was pointed out by geochemists G. R. Helz and L. Rosak-Channing of the University of Maryland, "... questions remain about the environmental effects of the general use of dechlorination." (Euroron. Sci. Technol., 18, 48A-55A, 1984). If the dechlorination steps are not thorough, toxic effects of a lower but still serious level may ensue.

Helz and Kosak-Channing note that dechlorination is being carried our at a dozen facilities in California and at about 50 waste water treatment plants in Maryland. Dechlorinating agents employed include activated graphite, hydrogen peroxide, sodium thlosulfate, and several SO2-yielding compounds. They note that better control of SO2 application is needed. The effectiveness of the process as well as evaluation of sublethal effects can be determined only by better analytical methods than are now being used.

It will be important to study the effects of the continuous release of S(1V) compounds

**AGU Committees:** 

Responsibility for the administration of

AGU lies with its Council, and the Council

depends heavily on advice from its com-

mittees. AGU committees bear heavy re-

sponsibilities and have significant stature

in the Union. Every committee chairman

meetings and to take part in a biconial

the Council without first having been

mittees; those that don't come to the

are remanded for future study.

planning session. Few items come before

studied thoroughly by one or more com-

Council from a committee usually fail or

Service on a committee is one of the

best ways that AGU members can become

shape its future. All committees expire at

the end of the President's 2-year term.

continuity and experience, many new

members will be appointed to bring in

new blood and new ideas. As incoming

President I have the responsibility for put-

ting together the vosters for AGU commit-

tees over the next lew months. To do this

If you wish to serve the Union as a com-

mittee member, or if you wish to nomi-

at AGU Headquarters. Please indicate

nate someone to serve, please write to me

which of the committees listed below re-

lates to your interest or your nomination

and what special thoughts you or your

nominee might bring to the committee. I look forward to serving the Union with

successor that careful consideration be

bership and depends upon its member-

from you now if you would like to help

Committee Responsibilities

Responsible for development of the an-

Committee on Budget and Finance

nual budget, monitoring performance

against the established budget, and re-

viewing developments that affect the fi-

nancial health of the Union, as well as

Committee on International

U.S. members in AGU.

Participation :

making recommendations on investment

Develops AGU policy on Union participation in international organizations and

oncerns itself with the interest of non-

Charles L. Drake

President-Elect

ship for its future; please let me hear

shape this future.

many of you and to recommending to my

given to those whose interest cannot be ac-

commodated at this time. AGU is its mem-

properly, I need your help.

While some committee members will be

reappointed in the interest of preserving

wolved in the activities of AGU and help

is invited to participate actively in Council

**An Opportunity** 

**Editorial** 

to Serve

downstream. The manner by which trace metals are compounded and their persistence needs to be evaluated. Unfortunately, it is the more subtle long-term effects on natural waters that cannot be known in advance that could be most pervasive,-PMB

## Lunar Core: Occam's Razor?

Whether or not the earth's moon has a core is a much bandied question. Like many notions about the properties of the moon, ideas of a lunar core changed drastically after the Apollo studies. A review of the development of these ideas was given a scholarly treatment by S. K. Runcorn recently (Nature, 304, 589-596, 1983). In contrast, L. L. Hood, C. P. Sonen, and L. J. Sinka have questioned the concept in serious detail (Nature, 307, 661-662, 1984).

Whether or not the moun actually has or has had a fluid metallic core is of great consequence for a number of geophysical theories about the solar system. Most investigators concede that the possible existence of a lunar core remains one of the major unanswered. and yet most critical, questions about the moon. A lot rides on the answer: Can a lunar-sized body have a core? Is the core metallic? How is the core related to lunar magnetism and its paleomagnetism? Is or was a lunar core related to lunar volcanism? If the moon can have a core, is planetary core formation in the solar system a simple matter of gravitationally segregating metallic fragments

Publications Committee

Has oversight of the entire publications

program of XGC. Operating under the

Publications Committee are the following

Books Board: Unitally reviews the en-

tire books program and coordinates the

which are the Antarctic Research Series

Board, and the Water Resources Mono-

charged specifically with soliciting and de-

veloping manuscripts for books and with

the critical review of submitted materials,

Journals Board: Responsible for con-

including all of the regularly issued serial publications of the Union. Under their

purview come timeliness of publication.

tions in information dissemination and

opportunities for expanding and improv-

ing the journals program.

Translations Board: Reviews proposals

for translation and publication of foreign

language books and journals, and retains

oversight of the ongoing journal transla-

Committee on Statutes and Bylaws

Assures that the statutes and bylaws of

Maintains a continuing review of AGU's

entire meetings program and recom-mends policies related to meetings as well

Elects new Fellows and, through its vari-

ous subcommittees, recommends medalists

and awardees. All members of the Com-

mittee of Fellows must be Fellows of the

Union. Customarily, but not always, one

member represents each Section. Under

following subcommittees, each of which is

chaired by a member of the Committee of

Fellows: Bowie Medal, Bucher Medal, Ew-

Macelwane Award, and External Awards,

Members of the subcommittees need

This Committee is in a state of reorga-

nization. It will possibly be divided into a

cerned with the recruitment and retention

long-range planning committee and a membership committee primarily con-

Council Committee on Financial

A fund-raising committee intended to provide leadership and policy direction.

is a steering committee which is imple-

Operating under the Council Committee

not be Fellows of the Union.

Membership Committee

of members.

Resources

ing Medal, Fleming Medal, Horton Medal,

the Committee of Fellows there are the

the Union are up-to-date and responsive

to the needs of the membership

Meetings Committee

Committee of Fellows

as new programs.

tion program.

the need and ability to respond to innova-

tinning review of the journals program,

activities of the various series boards.

Board, the Geophysical Monograph

graph Board. The series boards are

that were formed elsewhere? Implications of the questions are without limit. There is, perhaps, to more valid usue about the moon to explore scientifically.

The question of a lunar core is associated with a number of subtly perplexing phenomena. Note that the moon has no "normal" dipole field. The most sensitive instruments ever assembled detected no field and no minor components. The moon has small central pressures (approximately 50 x 10s Pa), and thus would probably not have formed a core: the pressure-temperature regime would be unique if it did. This picture prevailed until actual measurements were made by Apollo astronauts on the moon's surface and by Apollo scientists on returned lunar samples Lunar surface rocks have strong remnant and residual magnetic components, the orientations of which carry no evidence of the source of their magnetism. But, the rocks must have seen a strong magnetic field, their magnetic orientation otherwise would have been destroyed by the effects of meteorite bombardment of the moon's surface.

As the data on lunar rocks improved, a number of new theories rose and fell in popular support. The explanations range widely The moon could, for example, have been exposed in its early history to a strong intergalactic magnetic field. Magnetic effects could have been induced in lunar surface rocks somehow as the result of shock waves caused by meteorite impact. One idea that had to be tested was that lunar samples may have been magnetized, in part, by fields present in the Apollo spacecrafts on their return to earth. The tests actually involved carrying magnetically stripped lunar samples back to the

An obvious line of reasoning to explain the observed magnetism of the lunar crust that would be consistent with the present-day absence of a lunar magnetic field, was to postuate the existence of an ancient core dynamo. It was thought that geophysical measurements should be able to establish whether or not a fossil-cooled lunar metallic core sufficient to have produced the field exists. Seismic data presumably would have been sufficient. Unfortunately, the lunar seismometer had to be turned off, prematurely some believe, because of funding cutbacks in the Apollo program. Since then, assembled geophysical data, seismic, gravity, electrical field, heat flow, and other types, seem to indicate the possible existence of a 1000-km-diameter solid metallic core. The data do not require the existence of a core, but a core model would not be in violation of the evidence.

The answer to the lunar core question is not at hand, although an immense gain in the understanding of planetary magnetism has been made. Runcorn's review supports the core theory. Hood et al. challenge the theory on reasonable grounds. Runcorn, then, re-sorted to a more philosophical approach:

"That Hood et al. consider my account as 'somewhat misleading' can only mean that they do not appreciate that even though each line of evidence is not conclusive the fact that all point to the existence of a limar core lends much greater weight to the hypothesis than any one line could." To support this principal of reasoning Runcorn calls upon "Oceam's" Razor" as a model. Students of 14th century philosophy will also recall, however, that William of Oceam was a skeptic, having been accused of heresy by the Chancellor of Oxford

There are a number of scientifically sound reasons for returning to the moon. Perhaps when geophysical apparatus is again installed on the hmar surface enough will be known about the Apollo samples, galactic fields, im paci/shock induced magnetic-electrical field obenomena, lurar magnetic anomalies, plan eary dynamics, and core-dynamic theory to provide the basis for critical measurements to answer the lunar core question.-PMB

### menting the GIFT fund drive, and under the steering committee is a subcommittee on corporate supporting membership.

**Nominations Committee** Proposes candidates for Union office.

### Committee on Education and Human Resources

Concerned with array ting good students imo geophysics, and educational

### and employment opportunities. **Public Affairs Committee**

Charged with providing effective mechanisms by which members of AGU can contribute their expertise to the solution of societal problems relating to geophysics. There are two subcommittees: (1) Government and Legislative Affairs, which serves as the Selection Committee for the AGU Congressional Fellow and assists the Public Affairs Committee by reviewing and developing any programs re-ferred to it; and (2) Public Information, which supports press relations activities.

## Audit and Legal Affairs Committee

This committee of Council members has responsibility for interface with the external auditors and legal counsel of the

## **Tellers Committee**

Reviews election procedures and certifies the ballot counting (should be a Washington-based committee).

## Scientific and Topical Committees Atmospheric and Space Electricity; History of Geophysics; Mineral Physics

Each of those committees deals with the specific area described; each attempts to develop its interest within AGU, to serve tions, and to develop appropriate external contacts.

## Representatives

The Union appoints representatives to serve on a number of national committees or in connection with various other societies. Currently active are relationships with the American Association for the Advancement of Science, the PAIGH Commission of Geophysics, the Renewable Natural Resources Foundation, the U.S. National Committee on Rock Mechanics, and the U.S. National Committee for the International Union of Radio Science.

### U.S. National Committee for the International Union of Geodesy and Geophysics :

Every 2 years the President of AGU nominates eight persons for membership on the USNC/IUGG; of these, five are selected for service by the President of the National Academy of Science.

## In Congress Upcoming Hearings

The following heatings and markings have been tentatively scheduled for the coming weeks by the Senate and House of Representatives. Dates and times should be verified with the committee or subcommittee holding the hearing or markup, all offices on Capitol Hill may be reached by telephoning 202-224-

April 4: National Science Foundation authorization hearing by the Senate Labor and Human Resources Committee, Dirksen Building, Room SD-430, 10 A.M.

April 10: Markup of H.R. 4589 by the Oceanography Subcommittee of the House Merchant Marine and Fisheries Committee to ensure that the Coastal Zone Management Act (P.L. 94-370) is consistent with state management plans. Longworth Building, Room 1324, 10 A.M. —*BTR* 

## New Marine Community

While exploring the West Florida Escarpment, a steep slope in the Gulf of Mexico several hundred kilometers off the Florida coast. the deep submergence research vessel Alvin chanced upon a well-developed community of marine life akin to that found 7 years ago in the eastern Pacific Ocean.

According to the Woods Hole Oceanographic Institution, which operates the submersible and its new tender, the Atlantis II community contains large clams, mussels, crabs, fish, and tube worms like those found at hydrothermal vents in the eastern Pacific. While the east Pacific communities exist at spreading centers, the newly discovered group, which may stretch for almost 2 km at a depth of coughly 3200 km, lies in a passive continental margin. Also, whereas the water around the Pacific hydrothermal vents is much warmer than the surrounding seawater, the water around the new found community is apparently the same temperature as the ambient waters. The Pacific communities are now known to

survive using a life-support system called che-. mosynthesis that is driven by the geothermal activity at the spreading centers. The driving mechanism for the life-support system for the Gulf of Mexico population is not yet known. Specimens from the Gulf community have been collected for study. Scientists will seek to determine if the Gulf species are the same as those found in the Pacific or if they are new species. The researchers will also try to discern if hydrogen sulfide, which supports the Pacific community, also supports the new group.

Vol. 65, No. 13, Pages 113-128

Listric normal faulting along a western ring fault system dropped basel ignisheriton down to the sant with a maximum displacement of nearly 1 km. Eviteredding basement structures may have influenced the orientation a maximum displacement of nearly 1 km. 62-trending basesees structures may have influenced the orientation of the ring fault swetom. Andeste and active law of flowe overlie the Bonemen Tuff, marking a return to passive volcanism following explosive entrytions.

Slightly yourger stilete stocks and oseguenous rivolite domes were emplaced along the calders warging and were cut by ring fracture faults, suggesting a protracted history of calders collapse. Smelov Andesian inversion and the fault of the intercellar in the base for a stilete said and active. Initial Sr (8)/86) and late laws flows are chesteally similar high-X endesites and dactive. Initial Sr (8)/86) and late have flowed as the shell of the intercellar multipractude major assistiation of radiogenic Proceedings of these rucks and the absence of Pinian strial components to the ignishrites suggest that subvolcant suggest chanks at Bonemes did not become structly ecosystitudity and the absence of Pinian strial components for the ignishrites suggest that subvolcant suggest chanks at Bonemes did not become structly ecosystitudity and the same of the super bounds a tambers at Bonemes did not become structly ecosystituding and white matter. The Sounds a calders of 10 km, as the subvolcance of the collection of the volcance building andwelte matter. The Sounds a calders are to be closely related to two Oligacene calders to calders to the north (Mr. Astes and Crizziy Peah), which share a common position along the western sign of the morthern Bio Grands rift system. Farly Oligacene silicit usgestimm and calders forcation slony this trend way serk the initial phases of rift western perhaps heralding a change to a tomalonal attend region yield convergence of the rift valley. (Calders, structure, geothernology, Grippado), J. Goophys. Res., B. Paper 480251 C. J. Veschler (Bell Laborstories, Holide), New Jersey, 077133 Surprisingly large smouts of sulfur dioxide evolve from rapidly neared auxiles of Mr. St. Helens' ash. The sulfur dioxide has been detected and quantified using rapid besting-gas chromatography-mass spectrometry. As mamples from the hay 18, 1980, armytion collected at loses Lake, Missouls, and Helens produced average quantities of sulfur dioxide corresponding to 215, \$70, and 1250 pps, respectively. Similarly, as the distance of the collection point from Mount St. Helens increases, the ratio of psw magnetic sash to old mountain enterial increases. This suggests that the SO, is derived primarily from any magnetic naterial. Experiments indicate that the sulfur dioxide is not due to sulfure spaces scavanged from the eruption plums or to sulfur gases adsorbed on the ash. Other costilies sources include reduction of sulfute salts within the sah, bubbles of S0, trapped within the sahs, or sulfur blobs contained in the sah. Approximately as much sulfur dioxide or sulfur dioxide presurrors are associated with the sah as Mount St. Helens injected into the stratosphere. (Volcanic sah, ash corporation).

J. Caophys. Res., B, Paper 480251 RECORDITY VOLCANTE FIRED, SOUTHEAST CARGON AND REMISTA-CENTRAL BRYARD.

J. J. Bytuba (U.S. Gaological Survey, Menio Park, CA 98025), E. H. McZee
The Hobgratist volcanic field covers an area of 20,000 km² in mouthmantern Gregon and northwestern Herads and ros signs of saven large colone sub-flow absent which wented from 16.1 to 15 Ms ago. The volcanic field is characterized by peralkating, high-sities rhysites, and sit but one of the shoute are consolites. The ash-flow field overlies a 15-best but one of the shoute are consolites. The ash-flow field overlies a 15-best but are not not fill discount Season polesnic acres

J. Geophys. Reg., 2, Paper 480212 8699 Volcanology topics CALDERA VOLCANOES OF THE TAUPO VOLCANIC ZONE, NEW

porphyracic grammat is the ago, have forest ward intruded shout is and any have forest outward and flat young, and any have forest upward capular bodien which span administration of the capular bodien which span administration of the capular forest from the line command the forest opened from the same chanks release of treesure from the magnetism chanks release of treesure from the magnetant callapse. Many walles the school of the capular cap

129

# The Oceanography Report



The Oreanography Report The final point for played, chemical, grological, and bio

Associate Editor: Arnold L. Gordon, Lamoni-Do-herty Geological Observatory, Palsades, New York. 10961 nelephone 914/359-2900, ext. 325(

## NOAA's Service to Research

John V. Byrne

Ed. Note: The following test is excerpted from the author's remarks delivered at the AGU Ocean Sciences Meeting, New Orleans, La., January

I want to discuss two of the major areas of effort in which NOAA is engaged—service and science. There is a third area, management, where we have responsibilities for managing hyberies, marine and estuaring sagguaries, and so on. But that is not the focus of my remarks today. I want instead to concentrate on NOAA's primary responsibility, service, and on some areas of NOAA research that underpin our service functions.

All scientists know the difficulty of keeping abreast of developments in our own disciplines. But beyond that, there is always the ntriguing possibility that we can draw new ideas, methods, or rechnologies from other disciplines, and apply them to our own research. When we see what other kinds of research are being pursued—what the links might be with our own work—we can some times solve problems larger, and often more vital, than those we were initially addressing.

This type of linkage is particularly impor-tant to NOAA because of our responsibility to provide service involving the ocean, the atmosphere, and even space. (We have the responsibility of monitoring solar flares as well

as operating remote sensing satellites.) The architects of our agency must have recognized that the understanding of the ocean, its resources, and its interactions with mankind tay in better understanding of oceanography, meteorology, marine biology economics, and human behavior-and of the linkages among all of them.

## Service

Among our services to the ocean communi ty, we are proud of those offered by the National Geophysical Data Center in Boulder. Colorado. It has a couple of groups that you should find helpful-one for geology and geophysics, and another — under contract with the University of Colorado — for glaciology. They are looking toward some interesting new projects.

One of the projects stems from President Reagan's March 10, 1983 proclamation of a U.S. Exclusive Economic Zone (EEZ). It esablished U.S. jurisdiction over all resources in and below the oceans out to the 200-mile limit previously established by the Fishery EMENL ALL AL opened up great possibilities—ultimately for economic development and more immediate ly for scientific exploration.

NOAA and the U.S. Geological Survey are jointly planning a cooperative survey of appropriate areas in the EEZ using the Scabeam system on the NOAA ship Surreyor, and perhaps another ship, to come up with the necessary maps. This is truly an interagency and interdisciplinary effort, designed to take full advantage of the possibilities opened up by the President's proclamation. In addition, NOAA will focus on the physical, chemical, and biological aspects of those parts of the ocean. (I should add also that we have two excellent seagoing systems for high-resolution, multibeam swath surveys, and we are working closely with USGS and other interested parties in planning joint use of both of

The Seabeam system is a deep water system. It is used in water depths greater than 100 m, with swath widths of 0.8 times the wa-

In addition, we have a Bathymetric Sonar Survey System-BS3. It is on the NOAA ship. Davidson and is used in shallower waters:

(depths of about 10 to 600 m), with a swath width of 2.5 times the water depth. To the best of my knowledge, the BS' system is

Scientists from our National Ocean Service are working with USGS scientists to plan multibeam swath surveys of appropriate areas of the EFZ, sharing the funding and cooperat-ing in data processing and devising formats for the data. And their colleagues from our National Geophysical Data Center are also working with the USGS on an implementation plan for distributing the bathymetric information obtained from these cruises.

Of course, we also operate the National Oceanographic Data Center, I know most of you are familiar with it. If you are not well nted with its products and services. you'll find an exhibit and some helpful people here at this meeting.

Among NOAA's most important service reusibilities in the oceans are those providing for safe and efficient coast and marine operations. In addition to the many routine services that we offer — nautical charts, tide tables, and the like — we are working toward some new and very unusual products. They'll blend advanced technology and management techniques with traditional data presentation to provide much more up-to-date, and consequently more accurate, operational informa-tion in numerous critical areas.

One of these areas is port operations. We live in a high tech world of electronic computers, earth satellites and space shuttles and communications of astonishing sophist cation. But some areas, such as port operations, have remained essentially low tech.

Ships do have radio, radar, and depth find ers, it is true. But they are still dependent upon charts that give retrospective rather than actual data, tide tables that give predictive rather than actual data, binoculars to see and estimate the speed and direction of other traffic, and so on. Low tech, and sometimes

We are thinking of some major improvements both in the technical and in the manatgenient aspects of harbor operations, aimed at making ports much more efficient places. We call this Project PORTS.

We are beginning with systems to provide real time tide and water level information to ships entering and leaving harbors. To these will be added data on currents, waves, and weather, and possibly ice information in

We are also considering implementation of electronic display of digital nautical chart in-formation. Chart information can be transmitted via telephone wire, or telemetry, or distributed in cassettes for display on cathode ray tubes aboard ship. Untimately, perhaps, we will have an entirely electronic bridge, comparable to the instrument display in front of an airline pilot as he lets down to land.

We envision the day when a ship entering: harbor will display the appropriate nautical chart on a CRT screen on the bridge. Real time information on its exact position, channel markers, currents, and other data will also be displayed. The navigator will have a moving image of everything he needs for accurate and safe navigation under any conditions. NOAA will have a role in this, as will the local ports management and the private

Devising such a system would require the talents of chart makers, oceanographers, electronics engineers, managers of ports and harbors, and many others.

We have embarked on another, more immediate program to expand our services to the ocean community, through the establishment of an Ocean Service Center in Seattle. This center integrates the products and serv-

ices of all NOAA's main components. It provides one-stop shopping, if you will, for all the information we have, both realtime, such as weather, and retrospective, such as scientific publications, data bases or nautical charts. A major purpose of forming this center is to improve the quality of our products, and speed up their delivery to users. Scattle was selected for the first center be-

cause it is home to the largest number of NOAA employees outside Washington, D.C. - representing all our main components. if : Seattle center works as well as we think it will, it will bew the forerunner of others in res around the Nation.

The kinds of information the Ocean Service Center has available include—Atmospheric and oceanographic warnings, fore-casts, and analyses; Nautical charts, tide tables, current information, and the like; Marine environmental quality information Fish marketing statistics; marine advisory services; Information on marine mammals Status reports on special issues such as port evelopment, ocean outfalls, and Regional Fishery Management Plans; Information on major natural events such as El Nino: Information on major man-made events such as pilspills; Access to NOAA and non-NOAA

data bases. Among other things, the model and data base of the Naval Oceanographic Data Distribution System — which originates from the Fleet Numerical Oceanography Center in

Monterey, California - is now being incorporated in NOAA marine weather forecasts.

NODDS, as it is called, provides a suite of synoptic oceanographic and meteorological information including the present situation and prognostications in ocean areas. Its data sources include hundreds of Navy and other ships, fixed and floating buoys, satellites, and many other platforms.

NOAA took over funding for the commercial and non-Navy uses of NODDS last July 1. It is a great asset to our marine weather force

We are also in the early stages of developing synoptic global forecasts for the ocean which will be operational and will be disseminated through the ocean service centers.

Our ocean Service Center will not compete with private industry. This is fundamental to our philosophy and to our way of doing things. We will cooperate with business in dentifying products and services that have viable commercial markets, and that the private sector can best exploit. We will cooperate and encourage transfer to the private sector in

I have mentioned that service is NOAA's number one job, and the Ocean Service Center concept is a major effort to improve our service. We conduct a great deal of research, ranging from very applied to quite basic studies of oceans and atmosphere, but all of it is related to our missions of service. There are a number of areas closely related to your in-

I notice that your program included a full day session yesterday on El Niño, and another Friday on the Southern Oceans, which I ight conjecture bears some relationship to El Nino. NOAA has of course monitored and conducted a great deal of research on that momenon — as you might expect, because of what it will tell us about long-range climate effects. But we have other interests, in quite different fields. Linkages.

We have economists, in our Assessment and Information Services Center. They are most interested in the economic effects of El-

And biologists. Let me tell you about their

A year or so ago three groups of NOAA scientists were studying somewhat different problems out on the west coast. Marine meteorologists were tackling a problem posed by the National Weather Service for improving ce forecast models in the Bering Sea. Some physical oceanographers were studying ocean circulation in the area . . . and some fishery biologists were studying fluctuations in the king crab population there. Their problem: Why had crab production plummeted from 140 million pounds in 1978 to about five milion five years later?

Fortunately, the fisheries people looked to the others for help; the results of the three studies turned out to mesh extraordinarily

The meteorologists found that the position of the jet stream each year has a profound etfect on storm tracks in the Bering Sea --sending them far up north, or along a south-erly path, which influences the extent of the

The oceanographers found that this winddriven system also greatly influences ocean

The fishery biologists knew that king crabs release their eggs at the bottom, and that these float to the top as larvae and then, as juveniles, take about eight years to grow to the size where they enter the fishery. The juveniles feed on the large planktonic bloom that is normally found in the relatively undis-

turbed warm top layer of the water. As a multidisciplinary team, the three found that when storms hit the area, the water is thoroughly mixed, the normal large crabs have to serarch much further for food - which increases their exposure to predators. The biologists also think that the colder, s iess conducive crab growth, but they don't yet know which characteristic, or combination of characteristics, is most important.

Enter El Niño Through the process known as teleconnection, effects of the southern oscillation that causes El Niño are transmitted to the northern hemisphere, bringing about a strong westerly flow at lower latitudes than normal. The semi-permanent low in the Gulf of Alaska is strengthened, leading to more intense disturbances whose effects are again transmitted to the ocean,

This is, of course, the change in storm paths that influence the extent of the ice pack, as I have mentioned.

The economic implications of this are tremendous. If we can know enough about these fluctuations to model them, we can predict them - far enough in advance, we hope, so that some day we will be able to give the king crab fishermen adequate warning to modify their boats to hunt another species during a season or so. All because, eight or nine years previously, the jet stream didn't follow its normal course [ql And this of course stimulates further inquiry. The conditions that may cause a deorease in the stock

of king crab may be just right to cause an increase in other species. What species: If this hypothesis furus out to be true, and if we could find out the species, then we could also advise the fishermen, so they'd know how best to rig their boats.

We do know that last year's Southern Oscil-Lition FI Sino resulted in movement of many propord species northward, no luding vellow al, bourto, and barracuda.

From Tebruary to April of last year barracuda were caught in Monterey Bay, bonito north of San Francisco, and two tropical species -- popeve catalista and Pacific burfish -were found faither north than ever before observed.

We are continuing our studies of this probtem, using to take tull advantage of all the inkages among various disciplines to addres the mobilem of recomment. Which we are beginning to recognize as critical to the health of lish stocks. It is an area where physical seientists have much to contribute.

With respect to the climatological aspens of El Nino, an international research project -LOGA, for Tropical Ocean Global Atmosphere is going to take placeto explore the denamies of the great ocean-air mass whence El Niño arises. It will be a decade-long experiment. The International Project Office will be established in NOAA, and field operations are scheduled to begin about January of

Additional light is being shed on the whole phenomenon of El Niño through work at our ecobysical Fluid Dynamics Laboratory, h. has developed a complete ocean-atmospher model that simulates the amphication of modest mitial perturbations during El Niño Southern Oscillation events. The model reoduces the simultaneous growth of perturbations in the atmosphere and ocean.

A new model has also been developed there - in cooperation with the Armys Cold Regions Research and Engineering Laboratory - to study the interaction of sea-ice dynamics and the ocean circulation. It is a complet ice-ocean model, and was tested out for the Arctic Ocean-Greenland Sea region. using winds derived from the First Gobal. GARP Experiment to drive it.

Preliminary results allow a comparison between ice position with and without active currents in the ocean models. The effect of currents provides a much more realistic seesonal variation of ice front, as well as a sinulation of the salimity gradients near the ice boundary frequently observed in polar

The growth of polar pack we is realed both to the ambient air temperature and the strength of winds that deform the ice and control the amount of open leads and distribution of ice thickness. This coupled iceocean model will be carefully tested with the view of including it in a fully coupled global clinate model.

One of GFDL's most important efforts is the study of climate variability by means o these compled ocean-atmosphere mathemat cal models. The lab hasterently completed an investigation of the transient response of dimate to an increase of atmospheric concertration of COs. What they found was that the surface air temperatures over continents respoud more quickly to an increase in COz levels than does the corresponding surface temperature of the oceans, with their large thermal inertia.

NOAA is studying the oceans in many ways, from modeling to physical occanogra phy to biology. NOAA scientists are also going to be carrying on investigations of su geology, both within and outside the EEZ. This will follow up previous research on polymetallic sulfides and seafloor spreading alteady mentioned the Scabcam work of Sur-

n July of this year, NOAA scientists will visit sites of active hydrothermal venting along the Juan de Fuca ridge in a series of Alvin dives. Geological, Geochemical, and biological samples will be taken.

Our Class I ship Researcher will do a mul tidisciplinary cruise to the Mid-Atlantic Ridge in August for hottom dredging, water sam-

ing, and photography. And we aim to have bathymetric and tonic maps of the Gorda and Juan de Fuca Ridges available in September. We are attempting to coordinate our activities in this area with the USGS and, through the Nation al Science Foundation, with academic scientists. We are making progress, but not fast

enough - for you or for me, In addition to supporting Alvin dives, w have — us many of you know — a national undersea research network, operated for us by universities and available to qualified so entists of all disciplines. Of these, Hydrolab located off St. Crolx in the Virgin Islands, it the "old man of the sea" where habitats are concerned, It has been operational for many years and has proven immerisely useful. It is, incidentally, the only operating habita

system in the free world now used for scient tific purposes. Operated for us by Fairleigh Dickinson University, Hydrolab is in 15 meterse of water, and supports four scientist divers for a week. They can operate to depths of 50 he

ters, coring the reef and observing geologic and biological processes.

As part of this national network, we also support the two-man submersible Makali operated by the United Makali ope grated by the University of Hawall and a mo

bile open diving bell system with surface support ship operated by the University of North Carolina.

A temperate water hubitat is now under construction, to be operated for us by the University of Southern California, it will house six scientists for up to 30 days, at a maximum depth of 40 meters, with capability

for the divers to go down as far as 65 meters. And a fifth part of this national network is now being developed by the Universityof Connecticut, in support of undersea activities off the New England coast. The group is currently considering the appropriate kind of facility for the rigorous conditions of that area.

Iam sure many of you will be interested in a major workshop on the status of NOAA's undersea activities, which will be held in May at the University of Connecticut facility at Avery Point. It will focus on present ant future activities in all disciplines throughout our national undersea network, and we will be inviting major players from abroad as well

I have adverted to the EEZ a couple of



The Weekly Newspaper of Geophysics

For speediest treatment of contributions send three copies of the double-spaced manuscript to one of the editors named below and one copy to

Editor-In-Chief: A. F. Spilhaus, Jr.; Editors: Bell (News), Bruce Doc. C. Stewart Gillmor History), Clyde C. Goad, Arnold L. Gordon, Louis J. Lanzerotti, Robert A. Phinney: Manag ing Editor: Michael Schwartz; News Writer: para T. Richman; News Assistant: Tony Reichhardt; Production Staff: Dae Sung Kim,

Officers of the Union James A. Van Allen, President, Charles L. Drake, President-Elect; Leslie H. Meredith, General Secretary: Carl Kisslinger, Foreign Sec Spilhaus, Jr., Executive Director; Waldo E. Smith, Executive Director Emeritus.

Patricia Lichiello, Lisa Lichienstein, Cynthia T

For advertisma information, contact Robin E. Little advertising coordinator, at 202-462-6903 or toll fre at 800-424-2488. Advertising must be informaive and consistent with the scientific and educa donal goals of AGU and is subject to approval by AGC. Advertisers and their agents assume I ability for all coment of their advertisements und for any claims arising therefrom against th sublisher. Offers in advertisements are subject o all laws and are void where prohibited.

Copyright 1984 by the American Geophysical . Material in this issue may be photocoped by individual scientists for research or clas oom use. Permission is also granted to use more quotes and figures and tables for publica tion in scientific books and journals. For permis sion for any other uses, contact the AGU Publi-

Views expressed in this publication do not necessarily reflect official positions of the American Geophysical Union unless expressly stated.

Subscription price to members is included in an nual dues (\$20 per year). Information on insti-tutional subscriptions is available on request. Second-class postage paid at Washington, D. C. and at additional mailing offices. For, Transactions. American Geophysical Union (ISSN 0096–3941) is published weekly by

> American Geophysical Union 2000 Florida Avenue, N.W. Washington, DC 20009

Cover. Worldwide track chart of marine

seophysical data held at the National Oce-

anic and Atmospheric Administration Na-

tional, Geophysical Data Center (NGDC).

Boulder, Colo. Data collected along these tracklines include gravity and magnetic field measurements, seismic profiles, bathymetry, and sidescansonar. More than 16 million km and more than 15 million digital data records from some 28 major governmental, academic, and private reearch institutions worldside are covered. All data are in the public domain. A com-Puterized inventory and data-selection sys em called GEODAS (Geophysical Data System) is used at NGDC to identify and retrieve requested data from the digital o analog (microfilm, seismic cross-section, etc.) files. GEODAS is an interactive data management system with graphic capabili ty (e.g., the cover illustration). Data may be selected by geographic area, specified data parameters, collecting institution, date, cruise, and several other possible cri teria. Digital data selected by GEODAS

are supplied in the MGD77 exchange for mat on magnetic tape; microfilm and "an alog" seismic profile sheets are provided as one-to-one copies of their correspon ing media. Further details on the MCG77 iala exchange format, GEODAS, and oth er NGDC data services are available from NGDC, Code E/GC3, 325 Broadway, Boulder, CO 80303. (Illustration prepare by Dan Metzger of NGDC.)

times in my remarks today, and I want to mention it once more in closing, to tell you of a forthcoming event that I hope you will join me in supporting, it is the Year of the Ocean, which will begin March 10 - the anniversary of the EEZ proclamation.

The Year of the Ocean is designed to accomplish three goals — to expand public awareness and knowledge of the importance of the ocean and its resources, to promote a sense of stewardship for them, and to foster a public/private partnership for wise use and nanagement of ocean resources.

It is being run by a nonprofit Foundation created especially for the purpose, and is being funded by donations from industry and wher interested groups.
You will be hearing a great deal more

about the Year of the Ocean in frothcoming weeks, as programs are put together at both national and local levels. I look forward to your active participation.

## News & Announcements

## **AGU Ocean Sciences** Award: Feenan D. Jennings

The Ocean Sciences Section of the AGU recognizes Feenan D. Jennings' 25 years of excellent service and successful leadership in the ocean sciences community. He earned the B.S. degree at New Mexico State University (1950) and pursued graduate

studies at Scripps and the University of California at Los Angeles. Feenan's career in marine research management began when he left his position as Senior Engineer at the Scripps Institution of Oceanography in 1958 to become Head Oceanographer of the Geophysics Branch of ONR, a position he held until 1966. During his career with ONR, one of his additional duties was subelement monitor for basic research funds earmarked for oceanography. This important function involved mointoring, reporting and helping to detend the expenditure of all oceanographic basic research funds spent by the Navy. He was also instrumental in formulating and carrving through a ten-year ship plan which resuhed in the construction of most of the large oceanographic vessels now used by the U.S. academic community.

He became Deputy Director of ONR's Ocean Science and Technology Division (1966-1970) and then joined NSF as Head of the Office for the International Decade of Ocean Exploration, a position he held until 1978. IDOE was a new approach to multi-in stitutional, sometimes multidisciplinary, research, and it required skill, tact, patience, and considerable force to carry it through. Feenan's work as Head of IDOE was both arduous and superb. Under his leadership, the IDOE broadened its original scientific scope to include support for projects dealing with Living Resources. While at NSF, Feenan served for one year (1975-1976) as Acting Director of the Division of Ocean Sciences in addition to his IDOE post.

In 1978, he became Director of the Texas A&M University Sea Grant College Program, one of the largest in the nation. Since 1982, he has also served as Executive Director of the Texas A&M Office of University Research Services. The Sea Grant Association elected him its President for 1981. In that capacity, Feenan provided much needed leadership in presenting and defending the national Sea Grant budget to various elements Washington

He has served as a member or chairman of numerous national and international committees concerned with the planning and review of marine research, including the Intergovernmental Oceanographic Commission (1970-1978), the U.S. Secretariat for US-USSR Agreement on Cooperation in World Ocean Studies (1973–1978), and the Blue Ribbon Committee of the Marine Technolog Society (MTS). In 1981, he was named chair man of two committees of the National Academy of Sciences, one on Coastal Flooding from Hurricanes and the other on the DOE Regional Oceanography Review Panel. In 1983, he was appointed to the Texas Coastal and Marine Council by Governor Mark White.

Among his numerous awards and honors are the MTS Meritorious Service Award, designation as an MTS fellow, the NSF Distinnished Service Award, Navy Meritorious Civilian Award, Navy Outstanding Service Award, Navy Superior Service Award, and the Military Oceanography Award (from the Oceanographer of the Navy).

In summary, Feenan Jennings is recog-nized as the "Paul Bunyan" of oceanographic research managements he had the foresight to break new ground, the integrity to seek quality in the research programs he sponsored, the wisdom to respond to the scientific community's needs and initiatives, the leader-

ship to guide and support his program managers, and the requisite patience to deal with the tribes of principal investigators. For all of this, Feenan, accept our thanks.

> For the Ocean Sciences Section: Christopher N. K. Mooers President

> > Peter G. Brewer January 25, 1984

## California Coastal Study

Under a contract recently awarded Raytheon Service Company by Minerals Management Services (MMS), the California Coastal Current system will be investigated over a 30 month period involving 18 months of field

The study, under the guidance of Sig Larson, MMS COR, located in the Los Angeles POCS, is to gather a comprehensive data base aimed at describing the mesoscale dynamics in the nearshore regions (to about 50 km offshore) where oil production and transport are most active for the near future. MMS is most anxious that the study be coordinated with any other studies of the region that will take place coincident with the MMS program. The design of the survey has been tied to the historical studies, particularly CALCOFI (California Cooperative Oceanic Fisheries Investigations), to enhance the understanding of variability within the scale of the features ob-

The study encompasses a region extending about 50 km offshore, reaching from Point Conception to San Francisco. The field effort is more concentrated in the southern portion. Between Point Conception and Point Buchon, a grid of hydro lines at 10 km intervals will have conductivity, temperature, and depth (CTD) stations at 20 km spacing with expendable bathythermograph traces (XBT's) at the midpoints to detail the mesoscale structure of the shelf waters. North of Buchon, the CTD spacing will continue at 20 km, and lines will coincide with historical CALCOFI lines. Surveys are scheduled for January. July, and October 1984 and January 1985. The intense sampling in the southern portion will be repeated twice in an 8 day period. providing two "snapshots" of a region where the changes in flow structure appear to be caused by a number of dynamic events superposed on an equatorward mean flow that varies seasonally. Historically, studies have examined son

parts of the region for description of the flow and the dynamic processes. B. M. Hickey [The California Current system: Hypothesis and facts, Prog. Oceanogr., 8, 191-279, 1979] has summarized these. Recent studies report ed by C. N. R. Mooers [Initial results of the Optoma experiments, paper presented at the EDOC Conference, Lake Arrowhead, Calif., 1983] have described eddy structure with interlaced geostrophic "jets." Lagrangian trackers, in studies reported by R. Davis [Results of drogue tracking during code experiments, paper presented at CALCOFI conference, Idylwilde, Calif., 1983], have seemingly been caught in very high speed (greater than knot) offshore surface flows described as 'squirts". The name fits the high speed, narrow, limited extent (200 km) and duration (2) days) of the features as observed by the drogue experiments. Larger scale, more permanent, nearshore, high-speed currents are a regular feature of the region epitomized by the well known Davidson Current appearing in the winter months as a poleward flowing

surface feature. Eleven mooring locations (with vector averaging current meters in the near surface levels. Aanderaa meters below the near surface wave activity, and bottom pressure sensors a five moorings) will be located through the area on lines coincident with hydro survey lines. Eighteen months of data from the moored instruments will provide observation of speed/direction, temperature, and conductivity that can be interpreted in conjunction with the hydrographic cross-sectional profiles.

Lagrangian surface drifting devices will be

released during each hydro survey in two modes: (1) on three standard lines along hydro-survey lines as a complement to the hydro and moored instrument data and (2) seeded in specific features that are identified from satellite imagery. Satellite imagery and l' gridded sea surface temperatures will be acquired daily on a regular and continuing basis during the 18 month field program for the overview analysis of the surface dynamics. During tracking studies, the imagery will be analyzed in near real time to furnish direction to the seeding and tracking aircraft. With fuck, the data from the hydrographic survey, the moored instruments, and the tracking efforts will combine to provide a detailed description, in space and time of the dynamic events in the intensively measured region. Additional data to be acquired as part of the study will include hourly winds, temperature, pressure, relative humidity, and diurnal wave spectra from the NDBC buoys (furnished by Global Weather Dynamics, Inc., Monterey, Calif.); hourly winds, temperature, and pressure from nearly 20 near-coastal weather reporting stations (from Global Weather Dynamics, Inc., Monterey, Calif.);

synoptic reports including shoreside stations and ships of opportunity; calculated winds, wind stress, wind stress curl. Ekman drift, meridional transport on a 1° grid, derived from surface pressure distribution the calcuions follow the technique of Bakun (furnished by Global Weather Dynamics, Inc., Monterey, Calif.; water level data from National Ocean Survey station locations from Oregon to the Mexican border; and historical and current CALCOFI data for the alongshore region including Santa Barbara Chan nel to San Francisco and offshore to the limit of the survey lines (furnished by National Marine Fisheries-Southwest, Ronald Lynn.)

Close coordination between this program and the CALCOFI program has been assured by exchange of information on survey design and schedules. This is a CALCOFI year, and a major effort involving some seven surveys between January and September will establish the large-scale structure. Overlap of the two rograms occurs in the nearshore region. Further, increased effort by the CALCOFT vessel, Jordan, in the MMS area of interest during the March survey will fill the gap in the MMS survey schedule creating a uniform seasonal sampling pattern. Two or three of the nearshore CALCOFI stations on a number of lines will be occupied by both parties promoting comparability of the two data sets. The two programs take place in a time when the El Niño conditions may be in a declining state; thus the opportunity to capture the transition and, through comparison of the observed state to historically observed conditions, gain an exciting insight into the nature changes induced by the El Niño, makes is cooperation doubly rewarding.

Efforts to coordinate the study with other studies or programs in the region or in bordering regions have thus far resulted in an exchange of data and results with the OPUS and Santa Barbara Channel programs. For the Santa Barbara Channel program the availability of imagery will be a benefit in operations and planning. Other investigators plauting operations in the region during 1984-1985 are encouraged to contact the program management at Raytheon in Ventura to explore the benefits that may derive from a fiason. Data will, of course, be available through the National Oceanic Data Center as quickly as it can be processed to meet their delivery requirements; but early access may be beneficial to investigations aimed at explicit short-lived features.

The program manager is Robert J. Tan. Raytheon Service Company, 5126 Ralston Street, Ventura, CA 93003, telephone (805)

This news item was contributed by Noel B. Planchal Chief Seientist, Raytheon Service Compa ny, Ventura, CA 93003.

## The June Bacon-Bercey Scholarship in **Atmospheric** Sciences for Women 1984-1985

Expressly for women intending to make a career in the atmospheric sciences. This monetary assistance, provided through a gift from June Bacon-Bercey, a noted meteorologist will be given to a woman who shows academic achievement and promise To qualify, candidates must be one of

the following: • a first-year graduate student in an advanced degree program in almospheric sciences;

 an undergraduate in a bachelor's degree program in atmospheric sciences who has been accepted for graduate study;

e a student at a 2-vear institution offering at least six semester hours of almospheric sciences, who has been accepted for a bachelor's degree program, and who has completed all of the courses in atmospheric science offered at the 2-year institution.

Awardee selection will be made by the AGU Education and Human Resources Committee in consultation with the AGU Atmospheric Sciences Section.

For application forms contact: American Geophysical Union Member Programs Division 2000 Florida Avenue, N.W. Washington, D.C. 20009 (202) 462-6903

Application Deadline May 1, 1984

Positions Available, Services, Supplies, Courses, and Announcements: first insertion \$5.00. ad-

ditional insertions \$4.25.

Positions Wanted: first insertion \$2.00 addition al insertions \$1.50. Student Opportunities: first insertion free, addi-

tional insertions \$2.00. There are no discounts or commissions on

classified ads. Any type style that is not publish er's choice is charged at general advertising rates. Eot is published weekly on Tuesday. Ads must be received in writing by Monday. I week prior to the date of publication.
Replies to ads with box numbers should be

addressed to Box \_\_, American Geophysical Union, 2000 Florida Avenue, N.W., Washing-

For more information, call 202-462-6903 or toll-free 800-424-2488.

### POSITIONS AVAILABLE

Statistician/Water Resource Research. Excellent opportunity with Wyoming Water Research Center and Department of Statistics at the University of Wyoming, to perform statistical/mailtematical research, consult in parametric and stochastic hydrological and took limited. search, consult in parametric and stochastic hydrology, interact with nate agencies, and teach limited classes, including guidance of graduate atudent research. Requires a Ph.D. with demonstrated research ability in applied statistic, probability modeling and stochastic processes related to water problems. Mathematical and computer applications, i.e., simulation and programming, as well as prior consulting are also preferred. This tenure trark position provides rank and salary commensurate with experience. Our heation in the Medicine Row Range of the Rocky Mountains offers abundant recreational opportupities. Write Dr. Leon Borgman, reational opportunities. Write Dr. Leon Borgman, Bepartment of Statistics, University of Wyoming, Larantie, Wyoming 82071. An equal opportunity/affirmative action employ-

Applied Science Associates. Applied Science Associates, Inc. (ASA) a consoling ocean engineering and sciences little specializing in numerical modeling of shelt, coastal and mearshore processes, is seeking to add tenior level positions to it rapidly growing staff. Applicants with research interests in numerical modeling of oil spill dues and impact, ecosystem dynamics, markine and ground water by drodynamics and pollutant transport, and wave dynamics are of particular interest Applicants whiteld submit a tenine, evidence of the ability to generate a contract supported research programs, and the names of three references to.

Dr. Malcolnt 1 Spaulding Applied Science Associates, Inc. 329 Main Street Wakefield, Rhody Island 02879. ASA is an affirmative action/equal opportunity University of Denver/Research Positions in Space Plasma Theory. The Department of Physics invites applications for two postdoctoral research positions in plasma physics research group beginning

tions in plasma physics research group beginning July 1, 1984.

Postdotoral Research Associate: The applicant must have a Ph.D. in plasma theory with strong background in kinetic theory, non-linear waves and applied mathematics. Some experience in beam plasma instabilities is prelevable. Familiarity with space plasma and field observations and two of CRAY-I useful. The position is suitable for June graduate or someone with one/two year's positive total experience.

Assistant Research Professor: The applicant must have a Ph.D. in plasma theory with strong basic training in kinetic theory of plasma instabilities, numerical methods, possibly simulation techniques. Experience with space plasma and field data useful but not required. Successful research experience of three years beyond Ph.D. is required. This is a regular junior research position on a continuing basis dependent on annual reviews and availability of funds and carries with it usual fringe bettefus. Duties include participation in current programs of applications of plasma instabilities in space, research proposal preparation and occasional student supervision.

Please send curriculum vita and names and ad-

vision.

Please send curriculum vita and names and addresses of three references to: Professor V.L. Patel, Department of Physics, University of Denver, Denver, CO 80208, Salary: Competitive and commensurate with experience and qualifications.

The University of Denver is an equal opportunity/affirmative action envolver.

Faculty Position in Structual Geology/Tectonics.
The Department of Marine, Earth and Atmospheric Sciences, North Carolina State University, has an opening at the Assistant Professor level, in the area of structural geology and tectonics. We will fill this position with either a tenure track or temporary appointment beginning with the Fall 1984 term. For the temporary appointment ranks higher than Assistant rould be considered. A Ph.D. is reconized.

The successful applicant will be expected to teach

The successful applicant will be expected to teach courses in structural geology, structural analysis, tectuonics, and/or other areas of research interest. The tenute track appointee will be expected to develop a vigorous program of sponsored research and to direct graduate student projects.

The MEAS Department currently has 31 full-time facults, including 12 geologists and geophysicists. Please send complete resume and the names of at least three references to: E.F. Studdard, Scarch Committee Chairman, Department of MEAS, NC State University, Raleigh, NC 27(05–3208); telephone 919-737-2212. Applications will be considered as received, with a dosing date of May 1, 1984. North Carolina State University is an equal opportunity/allirmaire action employer.

Assistant Director/National Climate Program Office. The National Climate Program Office (NCPO), Rockville, Maryland invites application for a rotating profilion under the Intergovernmental Personnel Act (IPA). This IPA permits temporary assignment of employees between Federal agencies and State or local governments, institutions of higher education, Indian tribal governments, the Trust

## NATIONAL SCIENCE **FOUNDATION (NSF)**

NSF's Division of Ocean Sciences is seeking qualified applicants for the position of Assistant'Associate Program Director for the Ocean Dynamics Program The position is excepted rom the competitive civil service and will be tilled on a one- or two-year rotational basis. The per annum salary ranges from \$30,000 to \$45,000 far the Assistant Program Director and \$35,000 to \$55,000 for the Associate Program Orector The Program provides support for research or physical aceanography. The incumbent is involved in program planning and budgeling, proposal evaluation, a ministration of research grants, and liaison with other Federal agencies Applicants should refer to Announcement No. EX 84-35 EOS when submitting resumes to the National Science Foundation, Personnel Administration Branch, Rm 212, 1800 G St., NW, Washington, D.C. 20550 Attn: Catherine Handle. For further information call 202/357 7840 Hearing impaired individuals should call: TDD 202-357-7492

NSF is an Equal Opportunity Employer.

Geophysical Fluid Dynamicist/Aeronautical Research Associates of Princeton, Inc.—A Princeton-Based Research Corporation has a challenging pottom open at the Ph. D. experience level in Geophysical Fluid Dynamics. Physical Occanography, Meteorology, or Engineering with strong background in Computational Huid Dynamics. The successful candidate will have demonstrated expense in at least two of the following areas. Modeling of Cantent, Wave, and Scolment Transport in Coatal, Estimatine and Shell Waters: Development and Application of Three-Dimensional Numerical Model of Oceanic or Armispheric Phenomena of Messor Smaller Scale; Modeling of Turbulent Transport. We offer a creative work environment, excellent benefit package, and salary commensurate with experience, Send resume in complete conductor to Alexandria Lover, Aeronautical Research Associates of Puriceton, Inc., P.O. Rox 2229, Princeton, N. 198540.

An Equal Opportunity Athematic Action Fin-ployer M/L

Faculty Position/University of Montana. The Geology Department of the University of Montana's inviling applications to fill a temporary, one-year position, at the Assistant Professor level frontact be tion will be from and September 1984 to early line 1985). This position involves replacement of a faul-ty member on sublatical leave, Ph.D. in geology is preferred; however, M.A.'s with reaching or professional experience will be considered. Students plan some experience will be considered. Students paining to complete their Doctorate during the 1981-85 acidemic year are encouraged to apply. Tooching responsibilities unclude undergraduate course and introductory geology, mineralogs, periology (sedimentary), and a seminar in area of special interest.

Those interested should send a lener of application, resume, there betters of recommendation to: Arnold J. Silverman, Chanman, Department of Geology, University of Montana, Missoula, MT 9802. The DEADLINE for applications is May 13, 1984. The University of Montana is an albumatic at tion/equal opportunity employet.

Sentor Research Associate. The Center for Net-natules and Space Information Sciences at Stanford University is seeking applications for the position of Project Director Cambidates should have considerable managerial experience with space related spacement and he lamilian with advanced computer system technologies and their application to NASA space Hight programs. Center a divities heliale the development of breat area networks, network vittal graphics, database straffer, computer concurrency, video data processing and presentation, the development of teniore scientific operation centers, and other NASA-related topics.

To apply, send a fewtine and with names of three telerences to: Ms. Thurlet Smith, STAR Laboratory/SEL, Stanford University, Stanford, CA 9305
Stanford Conversity is an equal opportunity and afformative action employer.

the to interstellar neutral mainframe analyse large data sets using mainframe salary commensurate with experience. If interests in and qualified for this position, send resume, by April 27, 1984 to:

Professor R.A. Uriam, Chairman
Department of Physics
Boston College
Chestnut Hill, MA 02167

## **GEOPHYSICIST**

Faculty position in Selsmology/New Mexico Tech. New Mexico Institute of Mining and Technology Invites applications for a tenure-track position in Selsmology at the Assistant Professor level, The PhD is required. The position is a joint appointment with the College Division and the Geophysical Research Center in the Research and Development Division. New Mexico Tech has had instructional and research programs in Geophysics for 3 sion. New Mexico fecti has had instructional and research programs in Geophysics for 3 decades, and conters BS, MS, and PhD degrees in the field of Geophysics. Much of the geophysical research has been, and continues to be, related to the determination of the physical characteristics of the Rio Grand Ritt a major confinental rift in which Tech is localphysical characteristics of the rule Grand Hilt a mejor confinental rift in which Tech is located. We currently operate a 14 station seismograph network (jointly with the U.S.G.S.), as well as a 3-component long-period station. In addition, studies of the crust and upper-mantel structure are underway with portable seismograph systems using both earthquake and explosive sources. The geophysics staff and instructional program are part of the 16-member Geoscience Department, which also includes the disciplines of Geology, Geochemistry and Hydrology. The instructional and research activities of the Department are strengthened substantially by professional staff in the New Maxico Bureau of Mines and Mineral Resources, and by support groups in the Research and Development Division. In addition, several of the Tech staff have collaborative research projects with personnal from the nearby Sandia National Laboratory. Send letters of application, resume, and a brief description of teaching and research interests to: Alfan R. Sanford, Geoscience Department, New Mexico Tech, Socorto, NM 87801.

Equal Opportunity: Affirmative Action Employer.

Senior Applications Chemist. Kevex Corporation is seeking an individual with a strong Analytical Chemistry background, in particular in X-ray Fluorescence, for Applications Laboratory.

Three years of experience in Lab or Industrial Analytical Problem solving using XRF is required. Advanced degree in Physical Science or Engineering is preferred. Position requires Applications support to Marketing, Sales and R&D operations. Submit resume to: Mr. Drew Isaacs, Kevex Corporation, 1101 Chess Drive, Foster City, CA 94404.

EOE M/F/H/V.

## <u>Meetings</u>

## Announcements

The University of Texas at Dallas/Postdoctoral Openings. The University of Texas at Dallas occasionally has postdoctoral openings in the Physics Program. Current research areas include: XUV Lasers and Laser Spectroscopy (C. B. Collins and C. D. Cantrell), Space Plasma Physics (W. B. Hauson and W. J. Heikkila), Space Optics (B. A. Tinsley), Cluster for Studies (A. J. Canningham), Solid State Physics (R. Glosser and W. Chenge), Stimptly, presented in the College of the

Physics (R. Glosser and R. Chaney). Stipends are competitive. Interested applicants should send vita findination of sex and ethnicity for Affirmative Ac-

Staff Position/Department of Terrestrial Magne-tism. The Department of Terrestrial Magnetism of the Carnegie Institution of Washington invites applications for a staff position in geochemistry. Ap-plicants should have a demonstrated ability for ac-live and innovative independent research using frace-element and/or isolopic techniques to investi-gate the origin and geochemical evolution of the solid earth.

Applicants should send a resume and have three letters of reference forwarded by May 15 to:
Geochemistry Staffing Committee
Department of Terrestrial Magnetism 5241 Brood Branch Road, N.W.
Weshington, D.C. 20018.

Washington, D.C. 20015
Starting time for the appointment is flexible though a target date of late 1984 is preferred. Carregle Institution of Washington is an equal opportunity, affirmative action employer.

Plasma Physiciat. Ph.D. 1979 seeking research or teaching position. Experience in wave-wave, wave-particle interactions, radio emissions from sun and

planetary radio emissions. Good working knowledge of UNIVAC and IBM computers. Box 022. Ameri-can Geolysical Union, 2000 Florida Avenue, N.W., Washington, D.C. 20009.

Howard University/Graduate Assistantships in Geosciences. Howard University in Wadington, D.C. offers a new graduate program for the M.S. degree in Geoscience, made possible by a grant from the Gulf Oil Company. Areas of specialization are field geology/geophysics, geochemistry, and meteorology/hadrology with remote sensing. Some supends and assistantialips are available. Forential students should write to Dr. Fric Christofferson, Department of Geography Hoseard

partment of Geology and Geography, Howard University, Wash., D.C. 20059.

er Resources for Oceanography in the 1980's (1980–1981) and of the National Aeronautics

and Space Administration's Satellite Surface

valuable part of the job was the required vis-its to occanographic institutions to meet the researchers," O'Brien noted. "By knowing all

those people. I'm able to easily identify po-

O'Brien takes a keen interest in his stu-

young people to help him with the journal.
"Both in choosing reviewers and in choosing associate editors, I hope to bring bright, young scientists to help me with the editorial

An avid fisherman, O'Brien said he's start-

ng. His first article, entitled

ing a second career as a writer on outdoor

'Nighterawler Secrets in the South," will be

published in the April issue of Fishing Facts.

Suggestions, questions, comments, and manuscripts should be addressed to O'Brien, JGR-Oceans, P.O. Box 2173, Tallahassee, FL

Other hobbies include stamp collecting.

32316.—*BTR* 

tential reviewers, he added."

Stress Committee (1981-1982).

POSITIONS WANTED

STUDENT OPPORTUNITIES

## tion Statistical purposes is requested but not re-quired), and names of three references to: Physics Department, UT-Dallas, P.O. Box 830688, Richard-son, TX 75083-0688, UT-Dallas is an Afhrmative Action/Lapal Oppor-ludity Emphages Hydrology Days Update

The AGU From Range Branch "Hydrology Days" symposium will be held April 24–26, 1984, at Colorado State University in Fort Collins, Colo. (Eas. November 22, 1983, p.

A total of 35 student and professional papers have been selected for presentation on such topics as sand transport over cobbles; modeling the hydrology of flat, high water-table watersheds: mass transport in overland flow; catchment infiltration models from mathematical soil physics; computer simulation of the movement of water and salt in a hillslope; changes in hydrologic regimen of a disturbed watershed due to volcanism; the role of water quality in impact assessments; and augmenting reservoir yields using interbasin transfers.

A number of luncheon and banquet talks are also scheduled. John Bredchoelt of the U.S. Geological Survey (USGS) will speak on the subject of "Water Management: Who are the Managers?" at a luncheon on the meeting's first day. On day two there will be another function talk (speaker to be annotinced) and a hanquet speech by Robert C. Averett of USGS on "Hydrologic Research: Meeting Future Needs."

For more information, a complete program, and registration materials, contact 11. J. Morel-Seytoux, Department of Civil Engineering, Colorado State University, Fort Collins, CO 80523; telephone: 303-491-5448.)

Meeting Report

1984 Ocean

M. R. J. Pitam Constants and the constant and University of Books Introduced in the Constant and Constant and

### **Sciences Meeting** Attendees at the 1984 Ocean Sciences Meeting found New Orleans to be a very hosand a meteorologist the received an M.S. and pitable, convenient, and delightful city to a Ph.D. in meteorology from Texas A&M hold a conference, and the Fairmont Hotel to University), O'Brien's current research spebe an excellent meeting facility. There were 1100 attendees with a little over 700 papers cialties are in upwelling processes and in satellite oceanography. He has served on many presented. Change to the program and addicommittees and boards on these topics. For tional, late, and revised abstracts are printed example, he was chairman of the Naional Academy of Sciences' Committee on Comput-

Papers Not Presented 11E-02, T. L. Clarke et al.; 11F-06, C. B.

Officer et al. 12A-01, R. J. Gibbs and L. Konwar; 12A-Among the experiences that have most helped him to edit the journal was his stint as program director of physical oceanography in the Office of Naval Research from 1974 to 10, S. M. Pelowski and D. T. Long; 12C-06. G. J. Warren; 12D-02, C. Stallings and J. G. Rueter, Jr.; 12D-10, S. L. Shiff et al.; 12E-01, M. Weydert and F. N. Spiess; 12E-15, C. E. Denham; 12F-09, C. S. Smyth and R. W. 1976, "In that job I had to make decisions and help to make decisions on the entire spectrum of oceanographic and meteorologi-cal research," he said. "Perhaps the most

21A-11, D. J. Terrell and J. G. Mitchell; 21B-02, J. R. Strickler and E. C. Hing Fay; 21C-03, P. Gloersen and P. S. Schopf; 21D-08, R. P. Stumpl; 21E-06, F. D. Carsey and G. G. Pihos.

22A-08, T. S. Bianchi et al.; 22G-09, D. Blasco et al.; 22E-09, E. Swift et al.; 22F-04 dents. In the last dozen years, he has advised P. Stegmann et al. 12 Ph.D. recipients in meteorology and oceanography; he currently is advisor to six graduate students and runs a large research group, called the Mesoscale Air-Sea Interaction Group. He said he will also look to

31C-01, W. G. Harrison and L. R. Harris: 31C-07, W. K. W. Li; 31D-05, D. W. Blake; 31D-10, C. M. Seay and J. D. Thompson; 31E-01, C. A. Hagley and C. R. Goldman; 31E-04, J. C. Zieman et al.; 31F-15, R. H. Bourke et al. 32D-15, D. F. Williams and R. H. Fillon:

32D-17, M. A. Chartock, 41B-07, D. Deibel; 41C-14, R. Weyer and P. Cornillon; 41D-05, R. W. Flint; 41D-06, U.

42A-06, E. Ozturgut; 42A-08, R. C. Tyce and P. J. Fox; 42A-13, Z. Qian et al.; 42B-12. K. M. Bailey et al.: 428-15, V. G. Wespestad 42F-03, B. M. Lesht.

51A-01, D. A. Stow; 51A-13, P. Schlosser et al., 51A-14, D. J. Piepgras and G. J. Wasser-

52C-04, C. S. Weiler; 52C-10, J. La Roche; 52C-12, R. A. Hough et al.; 52D-04, R. E. Wilson and K-C Wong; 52D-05, D. G. Redalje et al.; 52D-08, G. S. E. Lagerloef and G.

## Late and Revised Abstracts

CURPEN C. SERESHOVER (Evene-Base

hater properties (temperature, salinity, cayges, light scattering, silicate, phosphate, natasys, teritum) were seasured along 7th between 22-33°N caring April, 1977. Maps of 15-17 daysh in the Cali Streem Recirculation Zone, show that the section intersected a vary-core actsy (AJU km diameter) containing a thick lays of newly normed 180 water. In the vicinity of the cody the Gult, otreem Actual Thousand I action to the cody the Gult, otreem Actual Flow was locally inchesized as a strong isotherm alone. The slope was contens Lateren the batter surfaces and the sem floor, and the volume transport equality of a large inection of historical eathertes too the Natura Flow.

Fluctuations (anomalise) of tater properties were

signal to measurement error varies with water property and position in the water column. The highest ration water account lychocine, saintly (k = 10): 10° water, mitrate (k = 9); cath pyrocine, nitrate (k = 10); forth Atlantic bug mater, milicate (k = 5); and Antertic button Water, saintly (k = 10). Strong annualine were from thoughout the water column including: many absaline of various properties concentrated in a wartical tard in the ulter 1 km of the occas; a matriant aboutly in the strong isother signs between greatures of 1800-1800 of a small thermosted (s) in x sy km) arbeithm in the half thermosted inside a thermosted in the Antertic Datton later lating a dynamic angust in the Look half of thater having a symmetric algorit in the lower half of the water column. The origins of selected anomalise water estimated to lie at distances of soveral know-Physical and Aumorital Parameter Departmentes in Open Ocean Significants

K.S. Haffiti, (Sandia Nationa) Laboratorios, Albuquerque Now Mesico)

Soveral series of numerical experiments using the historical occan house are described. Messay sees simulations over a name of spottal and temporal templetain parameters have been carried out to characterise the modal's numerical stantisty, a story of the without of shappro tritlers of sufficient occar and traject of shappro tritlers of sufficient occar and traject, of application is also presented. The stability relationship and tiltering vocability are used to investigate the physical parameter dependency in physically recommended with investigate and the throughput of the physical parameter without also the physical parameters without also the modalizations. The physical parameters without also the modalizations of the physical parameters without also the modalizations.

## Evolution of Sea Surface Tomperature Patterns for POLYMODE during the Winter of 1977-1978 bessed on Satellite and Ship Data

GEORGE A. MAUL and NICHOLAS J. BRAVO [NOAA, Atlantic Oceanographic and Metablological Laboratory, Hismi, Florida 33149]

Thormal infrared data from the Goostationary Operational Environmental Satellito were least squares fitted to in situ sea surface temperatures to produce maps at ten day intervals. Ectomsive cloudinass during December 1977, January and Fobtunery 1978, caused numerous areal data gaps, and limited the accuracy to 1.3 K. A composite mean map for the ninety day study period reproduces the Gulf Stream and the soutropical convergence; standard deviation about the mean shows variability in agreement with the POLYMOUT addy field. Ten day composite maps using GOS data only were areally too gappy to be objectively contouted. Combining the satellite and ship tumperatures into ten day composite maps would considerably improve the coverage and produce maps more in concert with the low frequency variability documented in the area by other measurements.

Service on the lower theory organization of a grant

working consider about a list make a first section of goodet day at the organiste both of 51 to 51 special love types over the years show some three-modes, variability but little colleges for long term change in any other of trate, silisate and prom-phate. A single year of time-cly sampling at photo. A lingle year of olsewely ampling at a nearby station then years earlier also provided no exidence for change. Subtraction of a hodern subtract of organic phosphate from values of trial posquitate for 19%-57 readile in average values within Federal ranges, as to indepose within the boat they had a fine to evidence of clange over about the last a fiveral years. No convincing evidence for the causes of small year-to-year variabline has been forthcolough atthough at least some changes appear to be real.

Meetings (cont. on p. 134)

# **Yours For** the Asking **PUBLICATIONS CATALOG**

1.9.8.4 Your own guide to ACU's current selection of books and periodicals. Contains brief descriptions, prices, and order forms

For your free copy, write or

American Geophysical Union 2000 Florida Ave., N.W. Washington, DC 20009

Attn: Marketing Dept. (800) 424-2488

## Geophysicist **Earth Science Department**

The Lawrence Livermore National Laboratory is an R&D facility operated by the University of California for the U.S. Department of Energy. Located in the San Francisco East Bay Area, the Lab employs 8,000 individuals engaged in challenging basic and applied

LLNL is now seeking a Geophysicist to join its Earth Science Department. The responsibilities of the position include the acquisition, processing and archiving of seismic data in support of senior seismologist in the areas of seismicity and strong motion monitoring. Additionally, you will do seismic data analysis including picking seismograms and locating earthquakes; run applications programs, such as location and inversion routines; read computer tapes of varying formats; and supervise field data acquisition utilizing both digital and field techniques.

The candidate we are seeking will have a MS degree in seismology or geophysics or equivalent. Primos and RSX operating systems and microcomputer-based data acquisition systems experience is highly desirable.

Lawrence Livermore National Laboratory offers competitive salaries, a liberal benefits program including health, dental, broadbased retirement and up to 20% tax deferred annuity programs.

To apply for this position, please send your resume, in confidence to: Art Wong, Professional Employment Division, Lawrence Livermore National Laboratory, P.O. Box 5510, Dept. KES-434, Livermore, California 94550.

U.S. Citizenship is required. An equal opportunity employer m/f/h/v.

Lawrence Livermore National Laboratory University of California

Territory of the Pacific Islands, of other approved nonprofit organizations. Emphases of a State of local government must be a permanent, career employee of that organization for at least 90 days prior to entering into a mobility assignment agreement with a Federal agency. Period of service is ofter year beginning October 1, 1984 with the option of a second year if mutually desirable.

The duties of the position are to review and help develop National and international Climate program plans; assist in planning, developing, and overseeing NCP project; and, advise in implementing dinate related activities of the United Mates in lialateral projects and the World Climate Program (WCP), Candidates are sought with the following qualifications: (1) Ph.D. in meterology on physical occanography; (2) Experience in preparing and requalifications: (1) Ph.D. in meterology of physical occanography; (2) Experience in preparing and reviewing research plans; (3) Knowkedge of a distance of national Climate Program (WCP) of the World Meterology of Organization (WMO); (4) Familiarity with applications of satellite data and technology to climate programs; and (5) Ability to communicate ideas through writing and oral presentations.

The NCPO under the IPA will negotiate salary, benefits and travel with the selective's connectating

The NCPO under the IPA will negotiate salary, benefits and travel with the selectee's competating institution. A resume, three references and curiculum viae should be submitted by May 1, 1984 (c). Dr. William A. Sprigg NOAA/National Climate Program Office Room 108., Ruckwille Pike Rockville, Maryland 20832 Telephone # 301-143-8981 An equal opportunity employer.

Trace Element Biogeochemist. The Academy of Natural Sciences' Benedict Estuarine Research Laboratory has an immediate opening for a postdortor al scientist interested in trace metal interactions with biota and transport through estuarine ecosystems initial appointment is for one year, with possible extension to two years. Please call for information or submit curriculum vitae, summary of research interests and names, addresses and telephone numbers of three references to: James G. Sanders, Benedict Estuarine Research Laboratory, Benedict, MD 20012, 301-274-3134.

Howard University/Graduate Faculty Position.
The Department of Geology/Geography invites applications for a tenure track position in geochemistry at rank of Graduate Associate Professor beginning August 1984. Position involves development of graduate research program at Master's level, Specialization in environmental geochemistry/geochronology/isotope geology desired. Send letter of application, resume and names of three references to: Dr. Pavid Schwartzman, Department of Geology/ Dr. Pavid Schwartzman, Department of Geology/ Geography, Howard University, Washington, Dr. 20060

Utah State University/Faculty Positions. Two re-search faculty/research scientist positions are avail-able in the Department of Physics and the Center able in the Department of Physics and the Center for Atmospheric and Space Sciences at Utah State University. Candidates should have a Ph.D. degree and experience in theoretical and/or experimental actronomy and space physics. Experience in the lollowing areas will be advantageous: experience in the lollowing of the chemistry and dynamics of the star acosphere/mesosphere; theoretical modelling of the terminage in stratospheric balloon, Space Shoute and suellife flights, in the design and fabrication of experiments, and in data analysis and theoretical modelling. The opportunity also exists for a smiddle candidate to assume program responsibilities for a major optical remote sensing instrument. A comprehensive database of terrestrial emissions covering the extreme ultraviolet to the near utilizated. ering the extreme ultraviolet to the near infrared, and extending from the surface of the earth to the

thermosphere, was recently acquired on Spatclab 1, providing significant data analysis opportunities. The group is also involved in the development of comprehensive models of the photos hemistry and dynamics of the thermosphere/ionosphere/ plasmasphere. It is planned to extend the modelling work to the stratosphere and mesosphere in support of balloon measurements of key radicals. Interested persons should submit a resume and the names of three individuals who can be contacted for softening managers. ve models of the photos her

Department of Physics
Utah State University, UMC 41
Logan, Utah 84322
before April 30, 1984. Sakny will be commensurate with experience. The Utah State University is located in scenk northern Utah, and is an allumative action/equal

Posidoctoral Research Associate in Planetary Postdoctoral Research Associate in Planetary Physics. One postdoctoral position in Planetary Physics will be available in August 1984 for one vest with probable renewal for a second year. Preferted experience with problems in classical dynamics, but other disciplines related to understanding the current state, origin and evolution of the solar system will be considered. Applicants should send resumes and arrange to have three letters of recommendation sent to: Stanton J. Peake, Department of Physics, University of California, Santa Barbara, CA 93106. Position will be open until filled.

The University of California is an equal opportunity/affirmative action employer.

Instrumental Analyst/UCSC. (Staff Research Associate III. Job# 84–0313) Fulltime permanent. Dudler: Management of automated XRF Spectrometry Lab. Duties include equipment maintenance, joint responsibility for calibration and quality control, system development and instruction of users. Opportunity exist for personal research. Requires BS in natural science and two years relavent experience or MS in spectroscopy theory and programming experience desired; knowledge of XRFS and FORTRAN preferred. Salary \$1,860 per month. Apply by May 1, 1984 to: University of California, Santa Cruz, Personnel Department, 102 Communications Building, Santa Cruz, CA 95064.

Computer Programmer/North Carolina State University. Extension Specialist in Biological and Agricultural Engineering. M.S. degree preferred, B.S. required. Position requires strong exportence in computer programming and data base management in addition to a working knowledge of statistics. Ability to program in a structured language and experience with SAS preferred. The person selected will interact white environmental scientists to build and analyze a data base on water quality programs nationwide. Salary range \$20,000-325,000 based on experience, Send features and the manes of three references by April 18, 1984, 1991.

Dr. Michael D. Smolen
National Water Quality Englaction Project
Water Quality Englaction Project
Relation NC 17608.

North Caroling Send Philography and portunity in marty and april 18, 1984, 1991.

North Caroling Send Philography and portunity in marty and project of the pro

1

Lecturer/Department of Physics, Boston College. Department seeks person to teach courses in the areas of space physics and introductory physics conduct research in solar wind including data analysis and theoretical research, and supervise physics department computer lacilities. Position required Ph.D. in Physics or Astronomy with arong background in space physics and heating of solar sind due to interstellar neutral hydrogen, and ability to analyse large data sets using mainfrance computers.

Air Force Geophysics Laboratory Geophysics Scholar Program (1984–1985). The Air Force Geophysics Laboratory (AFGL) and The Soutiest Geophysics Content of Electrical Engineers and Scientific Com AFB: near Boston, Massachuselti, and perform research in residence at the AFGL Company In the Soutiest Geophysics of the Armospheric Physics, Motorotopy (AFGL) and Scientific Company In the Cliphysics, Motorotopy (AFGL) (ATMOSPHER) and Engineers and Scientific Company In the Company

## James J. O'Brien: New JGR Editor A quality journal results from good scien-

tific work written up well by contributors and from good reviewers sifting out the best papers, according to James J. O'Brien, one of the new editors for the Journal of Geophysical Research. O'Brien, professor of meteorology and oceanography at Florida State University, began his 4-year term on January I as editor of the journal section emphasizing oceanography and boundary layer meteorology. O'Brien, who succeeds A. D. Kirwan, Jr., has

been receiving manuscripts since October. One change that the new editor has instituted is that an author can submit a paper directly to one of the associate editors instead tor is willing to act as the editor for a particular manuscript, then O'Brien will accept that. In addition to saving time, this change will enable the associate editors to apply their expertise in various fields in establishing appropriate criteria for quality in different disci-

Another change that O'Brien has made af-fects the journal's content. While the previous editor accepted papers dealing with properties of ice on the entire planet (in the sea or on the land). O'Brien plans to accept only those papers concerned with the physics of sea ice. Papers concerning ice on land should be sent to the section of JGR emphasizing research on the solid earth.

O'Brien hopes to decrease the time between manuscript submission and acceptance without sacrificing quality. To do this, the new editor has instituted a system whereby a prospective reviewer is telephoned to ascertain that the candidate reviewer has the time to review the paper. With this system, O'Brien hopes to keep the time from submission to acceptance to under 6 weeks. All JCR editors have adopted this procedure. Originally trained as a chemist the received

bert B. Smith. Four Members Robert J. Geller

Carter, Lawrence L. Malicontco, Jr., Soroosh Sorooshian, Sizuo Taunogai, William S. Wise. a B.S. in chemistry from Rutgers University)

first 3 months of 1984. The top sponsors, AGU members sponsoring three or more new members, are listed be-Ten Members Ro-

Three Members Adel A. Bakr, Neville L.

133

E22584

25.5

-1/(1/4p-1)

## HORTON RESEARCH **GRANT PROPOSAL**

The American Geophysical Union is soliciting proposals for the Horton Research Grant. One grant, in the amount of \$5,500, is awarded annually in support of research projects in hydrology and water resources by a Ph.D. candidate in an American institution of higher education.

The objective of the grant is to loster graduate student research leading to the completion of doctoral dissertations. Proposals may be in hydrology, including physical, chemical or biological aspects, or in the water resources policy sciences, including economics, systems analysis, sociology

The deadline for proposals for the 1984 grant is April 30. For a detailed description of the grant and a guide for proposers, write or call:

Horton Research Grant Member Programs Department American Geophysical Union 2000 Florida Avenue, N.W. Washington, DC 20009 202/462-6903

## Meetings (cont. from p. 133)

Payment Conservation of Engly Sedimentary Distancein on the Arabin Sholf

piping C. Aires, Jaco F. Macris, Strand M. Mensing (heps, of incephral of Sciences, University of Chicago,

the shalf region of the Armon River contains a complete spectrum of depositional environments ranging from highly cabile fined rands lacking information that the shall result of the shall result result in the shall result of t Pencialed with Te reduction are extraordinarily high levels of dispolved I., suggesting Fe exide as a carrier phase. These sedieves represent a diagenetic engirencemt with redes conditions in diagnostic environment with redox conditions in between deep-water regardle-poor areas where No, and Ma reflection deminates and regardle-rich press where No, reduction is the rule. This is apparently related to the about one of reactive Fe supplied from intertitic soils rather than lack of reactive organic matter.

HOROGADE VASIATION OF CHAIR PROCESSES ME CONSTRUCTION OF CHAINS AND CONSTRUCTION OF CHAIR AND CONSTRUCTION OF CHAIR PROCESSES P.H. Chill. (1998-Scallment Finlerion Center,

parpling at Alexantorvals in the mised layer and capting at Adm intervals in the mixed layer and types pycholing to determine concentrations national range lengths, pycholiness, plant payments matrients and particle Administration principles that atten-uated errors of darpling and manufactors. Degree of the microscole patchiness appears sensitive to the type of macro-ombiforment samples, on organism rotality, and on adjuse of variation of the microscole environment.

Problematy analyses targest that gargated processes contents the Character of population discountries, so that feeding sections by gauses and foregers with indicated that, social would depen situately on missing the standing appeared in nature. Results are applied to the highest of target anchory survival and

Attracture, and active and passive rejection in the feet githmrate process of suspendic feeting placetents sucremmatageans

J.B. STRICELED, H.C. CREGARM, E. MING FAS (Australian Instatute of Marine Science, Townsellia, & daid, Australia), and (g.A. PASSEMERS) (Exicasey Institute of Corarography, Savannah, Georgia, 3191b)

Crustenses acopjankters (e.g. cledcarane, calardis) select their fars on the table of olfoblicm, taste, and touch. The rejection of guapeared particles happens at different stages:

(A) Austre of telesteral response
 (B) antive avaidance

(2) Pont-rapture
(A) transdiate rejection of mangle particles
(B) rejection of accumulated particles

On the tasts of high aread micro-cinemategraphy and Schlapen sacro-CCIV we were able to charve the structure of the feeling currents, the raths of water through the feeding suchinery, determine the locations, modes, and ranges of perception, and register the reactions and focd handling successes of the animals.

A synthesis will be presented and all results will be graphically shown in a condist, 20-minute

2007.3

The Effect of KI himp on Widconcaths and the Greek of the Sient telps description of the Sient telps description.

a. C. Pinigrata Department of Biological Celences, U.D.C., toe Angeles, Ct. 98059. D. L. Rosterson Cataline Warins Science Center, U.B.C., toe Angeles, Ca. 98059.

Hydrographic domilitions near Smots Croating

phenomenon. Yes surface temperatures (937) were not unusually high during the first 9 nonths of 1983, however the rate of surface coming during the fall appeared to be lover, resulting in higher SST's at that time. There were significant differences in the temperature-nitrate regression between 1983 and the relatively typical 1980-8 period. While the slope of the T-U relationship was the same during 1983, the 1-Intercept was much lower than it had been in 1980-81. All isotherns were pushed deeper than normal, in particular, the 1981 isothern was 2-3 times deeper than it was during 1980-81. Low frond elongation rates resulted in nany fronds forming terminal blades before reaching the surface, and low rates of frond initiation did not keep pace with frond closs. Asip standing stock, as necessived by frond density, was reduced by an order of magnitude over 1980-81. This has resulted in an elimination of the surface campy. Furthernore, it is clear that pulses of cold, nutrient rich water linked to the internal tides probably pravides an important nutrient source for these plants during cost sunners.

### 217-154

Mydroclimatic Anomalies and Cycloganesis in French Folyneals during 1981

F. Rougerie (Centre ORSTOM de Tabiti, 8P529 Papeete, Polymasie Française) (Spansor: D. B. Enfieldi

(Spansor: D. B. Enfield)

The southern summer of 1983 (Ducember 1982 - April 1993) has been sarked -- in the central south Pacific and expectally in the Parquess Islands -- by anomalously low aumospheric pressure, westerly winds and heavy reinfall. These abnospheric disturbances ratched strong anomalies in the oceanic surface layer; among them a rewested of the sungle westernd drift between 5% and 15% and a 1 to 3% heating above the climatic mean in a layer as deep as 80 m in the Marquessa erea.

Such exceptional aumospheric and oceanic conditions first resulted in the shifting to the central and eastern Pacific of a large part of the heat content usually stored in the western Pacific and Loral Sea. The prarequisites for cyclogenesis where thus met farther eastward than usual as early as Decomber 1982 and sis hurricanos were to cross through french Polymesia between them and April 1993.

Starting in June-July 1993, a restoration of the Easter Island high pressure center and easterly trades initiated a return to normal hydraclimatic conditions; normalization was almost achieved by the end of October 1983, except for an excess of heat runtent persisting between the Harquesas and Peru.

### 21F-17A POSTER

Observed Circulation Hoden in A Fjord Estuary

J.R. BOLBROUN
G.A. CAMMON
tall at Pacific Marine Environmental
Laboratory, 7000 Sand Point May, B.E.,
Scattle Mashington 981151

Siguitaneous observations of currents and wate properties were gade from 17 current seters mocred on ten arrays in two sections across East Passage in southern Pupri Sound over a 31-day period between Harch and April, 1983. These observations, supplemented with CTD profiles, whose-based wand dats, and far-field current measurements, were used to describe the apailal distribution of mean and sublidal current variations. The mean circulation consisted of a unidirectional southeard flow with a maximum velocity core at mid-depth driven prisarily by mon-linear itadal dynamics Topography (overs the non-linear tidal dynamics. Topography forces the northward compensating flow through an adjacent channel creating a clockwise circulation around a channel creating a clothwise circulation around an intervening island. At subtidal line-scales three circulation modes are evident 1) a near-surface tupper 20 orders) wind-driven their, 21 a near-surface depth layer (30-100m) modulated at forthsightly periods by nonlinear mixed tides, and 21 a near-bottom layer (150-200m) dominated by density currents which propagate up-sutuary mixing generation during neap tidal stating at the entrance mill to Puget Sound. by a result of three diverse modes, apatial correlations were high (RPO.7-0.4) across (bannel, but were low and generally insignificant over vertical distances greater than 50m.

## TOTAL SERVICION

Sediment Dispersal and Accordistion in Quinquis Canyon; Interduction and Explications of Particle Size Amelyais

g. c.asco; G. N. Nijuba (Both at: Department of Geological Sciences, Lobigh University, Bethiehem, PA 16015) C. T. Bakka (Aud., Pacific Marine Portronautul 1st., Costing (Aud., Pacific Marine Portronautul 1st.,

Quinault Lanyan forms the secural and of the tolumbia stren-Mashington shelf-continental slops sediment disparsal system. An experiment to relate water column denuties to tadeto sediment transport and deposition in Quinault Lanyon was conducted between 1980 and 1982. Arrays or current reterm, transplanceters, and sediment traps seru deployed tervem October and January of each year. Remait accumulation rates were determined from Ph-210 and Cs-11; profiles on 20 hox cores. Electronic size analysis of suspended particulate curter (SPM), sediment trap supples, and box core tops indicates that tuch of the sediment property over Quinault Canyon in storm related, During winter storms (upwelling indices -200 m. scalvo on, clave, sites, and cocasionally, sands, suspended over the shelf, are and creamionally, ands, suspended over the shelf, are dispersual seasord as a strong intermediate methods it are dispersual seasord as a strong intermediate methods it are fitth. Letward transport within the 15th tomults in size fractionation so that eroper-plated deposition at the wheat break is characterized by 19-170 nm particles, while 15-10 km downcanyon, sedimentation is decided by particles 27 nm. Particles 23 km sand porhaps insigned are rapidly 4 to days near-negative from the 15th as aggloranter/facel policies. In contrast to the secundation partern inferred to result from 18th teamports, the west botton meghalicity in contrast to the secundation partern inferred to result from 18th teamports, the west botton meghalicity layer (BRL) and surficed by storm, and covers other up- or down-cancer, carrying predminantly line-grained 1 to united. Seafment accordinates, at any one location, then, apparently resilects a crealination of 18th, 3th-derived particulate matter, and does not support a simple model of decreasing comperency downcanyon. islomelly, sands, suspended over the shelf, are

## 325-11A FORTER

Optical Variability of the Ocean from the CZCS K. PPACOCK (Johns Hopkins University Applied Physics isboratory, Isurel, Waryland 20707)

C7C3 results have been used to enasure the varia-bility of the ocean over large steam. The type I waters of the North Atlantic are compared with the Types II and III waters of the North Pacific. The techniques used to quantify the variability are as follows:

fellows: <u>Rediance Veriations</u> show the reflectivity variations ever large and easil areas and desonatrate the atrik-ing difference between type I and type III between. <u>Color Variation</u> (in which the color is the ratio of radiances in two spectral champals) have been computed for small areas such as wern sore rings, shallow waters and large cross press containing different water masses.

where any large cean areas containing different water masses.

\*\*Special (harmel Relationships display the radiance in one channel against the radiance to snother channel or the water color. The great diversity of these taguits such at it difficult to generalise the data.

\*\*Special harm been plotted to above the special variability of radiances and sofers for a selection of North-Ecourt and Fast-Vest tracks covering a radge of water types.

\*\*Special Participals have been used to show the two radiances of color difference as a function of the agrantion between two points.

\*\*Free tracks of the color difference as a function of the agrantion between two points.

\*\*Free tracks of the color difference as a function of the agrantion between two points.

\*\*Free tracks of the color of the colors and radiance warriations have very divaries characteristics from region to region: Ealationships between characteristics from region to region; Ealationships between characteristics for different water types.

R. Q. DeLaune, C. J. Smith, <u>W. R. Patrick, Jr.</u> (Laboratory for Werland Smilg and Bediments, Louisians Bates University, Saton Rouge, La. 78803-7511) 70803-7311)

G. Day, Jr., C. A. Miller (Center for Werland)
Pandirces, Conistens State University, Baton
Rouse, La. 70803-7500)

Sedisantacion fattarns in Acchafalaya Doice Watlands

526-11

property of a state of the state of the sendor the notice of a the control of the Machael State of the State perspected existence of the General Landscape for the control of the control of the General Landscape for the control of the General Landscape for the Control of the Contr

lunging Griddod ocophysical buta from tour tour to not occor for Periodal and Global Tectuals Gradies.

J. R. MRISSEL (first three at: Lamont-behalt).
J. L. LASRECQUE Coological Observator: of Ladortic
M. F. HARBY University, Pathades, 37 (1995)
G. D. KARNER (Bureau of Mipural Patenticus, F.O. For
178, Camberra City, ACT 2501, Australia)

178, Camberra City, ACT 2001, Australia)

Satellite missions such as SEOS1, MANAT and MANAT register with the new digital bathments, data and constructed at the U. S. Manal Occurring apply. Of the most provide sufficiently uniform coverage of the most provide sufficiently uniform coverage of the access to allow a more integrated approach to be testing techniques provide an effective mana for displaying techniques provide an effective mana for displaying techniques provide an effective mana for displaying information contained in those combined data sets. Interpretation, either in terms of testiones or resource evaluation, is generic facilitated by the ability to enhance linear transfer subtle regional textures, and by the ability to display complementary data sets aids—by-side or by overlaying images. We illustrate the advantages of these me techniques to presenting color images which display back-fully testing presenting color ingress which display back-fully trained and seafloor topography, solutifier, and insential and seafloor topography, solutifier, and insential and seafloor topography, solutifier, and the MAGGAT total intensity anomalies over Australia, but and MaGGAT total intensity anomalies over Australia, but color reliaf images, perspective images, and percenting others diseasing a ridded gauphysical data including color reliaf images, perspective images, and percenting structing stereographic pairs.

Brillouin Scattering as a loci for Ocean Reasure ent; Assem G. Hirschberg (Dept. of Physics, University of Physics, Univer

(Sponsor: Roward P. Gordon)

Arong the most important measurements in the only are the temperature, sound-velocity and turbulity, as functions of depth, these can be made apridity by using back-scattered laser light. Among other costibilities, the Brillouin effect seems most favorable, because the marrow lines are not appreciably subject to interferences and it is very intense. We have developed a double Fabry-Perot measurement method adapted to the pulses necessary to obtain depth information. The sound velocity is proportional to the wavelength spread between the Brillouin components, and is obtained by the intensity ratio from the two interferomaters. The depth is inferred from the two interferomaters. The depth is inferred from the two interferomaters. The depth is inferred from the time difference between outgoing and incoming pulses. The intensity of the stiffed compared with unshifted components gives the turbidity, while the temperature is calculated from the cound velocity and the depth. Salinity must either to extensible or measured independently. Experiments in the laboratory and in ocean mater from the sea wall of the Mami ship canal are in adreement with theory. An on-erational system is proposed.

Discrimination of Phycostythrin-Containing Synecho-coccus spp, by Flow Cytometry

A. H. WOOD (Dept. Blophys. & Theoretical Biol., Univ. Chicago, Chicago, IL 80637) F. K. HORAN and K. MUIRREAD (Smith, Klina & French Lab., Philadelphia, PA 19406) J. S. WATERBURY (NHOI, Woods Hole, HA 02547) C. H. FRINSCH and D. A. Philadri (Bigelow Lab., M. Boothbay Mbr., HE 04575)

Flow cyrometry offers the possibility of identi-

Flow cyrocetry offers the possibility of identifying subpopulations of autofivorescent calls on the basis of fluorescence intensity in different regions of the spectrus. On appropriately equipped instruments, individuals from subpopulations thus identified can be sorted for culture inoculation or analysis using biochemical or afterscopic techniques. Since phycocrythrin (PFI-centaining Synechocycus app. show satisfuoreactures from both PK (350-390 m) and chlorophyll a (580 m) when excited at cavalengths which are absorbed by PK, us hypothesized that this property could be used to distribute the property could be used to distribute that this property could be used to distribute the property could be used to be used to distribute the could be used to distribute the physical paper of the physical paper of the property of the property of the property of the physical paper of the papertum. When this instructorial configuration was used to enalyze natural populations of the physical paper of the phys

used to analyse natural populations of star-fraction-stard phytopianton, savaral subpopulations of hi-containing Synachoroccum-like culls were riverly identified. Individuals were sorted from them subpopulations and used to entablish closel cultures. These bave been identified as the

Chroscocold cyanobacteria in the superctic Partitional during June, 1983

Concentrations and biomans of chroscolerid ryan-bactaria and enterprite calls were determined untilly optilizate and enterprite calls were determined untilly optilizate and enterprite ranged from 2 x 105 to 1 x 105 cells 1-1 with humaing usually in the upper 10 m. Concentrations dorrounds markedly with depth early in the sampling period, but not at the end. Estimated cyanobacteria chlorophyli comprised from 1.2 % to NOV of total massured chlorophyli. The high rencentrations of complexity and may be related to 'II Nino'.

Primary Productivity and Trapsparency as a Measure of Lake Eurrophication

C. N. LOLDINS (Division of Environmental Studies, Volversity of California, Davis, CA 93nifi

The measurement of primary productivity to satabilish the trophic status of lakes has been not with mired enthusiass over the years. Transparency, in contrast, hes generally been regarded with favor sloce it is easily understood by the public. Lave labor, California-Newads, the tenth-deepest labo in the world, has been used in this study as an example of a labe experiencing the early stages of cultural surrephication, an extensive dare set shows an example surrephication of extensive dare set shows an example productivity and transparency in the extremaly productivity enters to integrate the chemical. This is an excellent measure of integrate the chemical physical and biological components of a lake. It is an excellent measure of the progress of surrephication, Lake Table is releminessly losing its remarkable transparoncy at the rate of a third of a sater. Primary productivity measurements to half a cater. Primary productivity measurements teen aince 1999 indicate on annual increme of the progress of year.

Matriant availability to the suphotic zone from

year. ant availability to the suphotic zone from

containing Synechococcus upp.

*ነ*በለ- ሁለ

James D. Byrne

(Sponsor: Howard P. Gordon)

Sec. the sheat and Shotte Protects begalating Entrient and a tire of the day to bourte upon Pry Lighting

t. M. Californ (Burther C. Lener, Department, Center for Estimate content, tools the State University, But a Recty, 11, 1990)

b. G. Tengor (treated by Joya Latitative, Center for Meeting by ourse, Louiston, Carlo Phivorsty, Paran Songe, Lt. 7000)

L. W. Dar, H. Grand H. Freder, Laboratory, Center for Meeting K. Paran Songe, Lt. Tools and Carlo Bulgereity, Paran Songe, Lt. June 11

through the desired and the content that the physical forms of the the detection of the condition with the forest price of desired and wind in components of with the forest price of prices of british and the reduced to the forest transmission of the forest of the ward attention for the first transmission of the forest of the ward through the reduced the condition of the forest transmission and torbuilt transmission. The color ward transmission and torbuilt transmission of the opening transmission of the forest transmission of th so a bestead analyses among that the physical

Transport Health and Company of the L.M. Bente, Proc. C. Madden, Fiz. Schooling January, 2017.

Option but we found that he all the could of Madee. By including the could of Madee. By including the could of Madee. By including the found that he are the first of Madee. By including the factor of the first of the could of Madee. By including the first of the first of the could be according to the could be a first of the first of the could be according to the first of the could be according to the first of the first of the could be according to the could be according to the first of the could be according to the coul

The Development of an Informative Procyeties in a Coastal Treabacter betrain to recover

Law, Jany, Jr. Conserval Tendons Laboratory, Center for Medicand Reconserve, Conference States University, Barton Rouge, Ltd. (2000)

Martinial Recognition, 2000 M.

The Archardatora Pivel, a discribinative of the Mississippi River, currier, about the of the total fice of the Mississippi River, currier, about the of the total fice of the Mississippi River, currier, about the of the total fice of the Mississippi River, currier, about the tent for each content of the man described and state of an entering of river water with the man dated ampended and dissisted and relate has been a strong influence on the local conetal area. By example, where took the southern extent of trees march the moved south by even 10 km. The river water who has high concentrations of higher their water about the moved south by even 10 km. The river water about the moved south by even 10 km. The river water about the man reduced by fatter appeared to the plant plant plant [1] and mappended sold sector, there is a rapid depletion of higher explaint one in admitted partial water by a surface in admitted plant in the reagaing date in river in admitted that is presented in the first opening accordant to the plants. For example, the admit of sold has a surface of these plants, for example, the admitted the plants are admitted to the limit become of the plants of the plants. For example, the plants are computed to most other compact to the limit become and to move a computed to most other contribution. In a benefit is now after a post of the contribution of the relation for said upon the date of the plants and transported to a post to the latest appear and transported to an example of the plants and contribution and appear of the plant and contribution and appear to the latest appears to be antivising well in a reason which are statily fresh sater. The solution of the plants appears to the latest appears and the plants of the plants and contribution appears to the latest appears and the plants and contribution and appears of the plants and contribution appears to the latest appears and the plants and contribution and appears of the plants and contributed appears to the latest

Republic Inducted Composity Bygomics and Hassistic Plan in a Physic-hombiod of Entirery

J. P. Sibero, Y. G. Teague, W. B. Sikera, and J. W. Day, Jr. (Counted Frederic Industry, Center for Wolland Renources, Landmines State University, Buton Resge, La. 708031

During a comprehensive bitudy of the Fouriesgus by subsystems of the Architataya belog ostuary (Losisian) uSA) bett brighter expensive and and assignant water fluxes of discrived inorganic and arganic nitrogen and phospheren were measured. Benthic flow. Differences were measured in both benthic flow. Differences were measured in both benthic macrofoling and metalling drawing in both benthle flod. Differences were measured in both benthle flod, Differences were measured in both per community structure and function between the upper and the lower station, which has stronget saring and the lower station, which has stronget saring and the injurences. At both the higher salinity and the lower salinity station assemble flux appears. Besthing the lower and the station of the day of the lower purishes, lowever, is nogatively related with higher uptake, lowever, is nogatively related with higher uptake rates when shoundance of the day att-isodiff macrofoling is low. The effects of deposit teaders on nutriout fluxes are discussed.

Geomorphological Influences on Biological Committee!
The Atchafeleya River Delta - A Cane Riscott

BRUCE A. THORPSON (Coastal Ecology Lab., Longitum State University, Baton Rouge, LA 70807). RARDY H. ROBERTS and JOHN T. MELLS (Coastal Studies Inst., Louisiana State Univ., Baton Rouge, LA 70807).

inst., Louisians State Univ., Saton Rouge, is

The main constal area of Louisians has held forms,
by a microscive sories of delta cycles through significant changes in the course of the Massissiph giver
leant changes in the course of the Massissiph
figuration of the course of the Massissiph
figuration of the course of the Massissiph
Great interest has been shown in understanding the
Great interest has been shown in understanding the
proceedes that are responsible for the workshow
elamness in the evolution of deltas in Louisidality
protected to the course of the Massissiph course
elamness in the evolution of deltas in Louisidality
particularly with the rate pad form of the substant
lobes' Recent word has shown that the chains process
and subserfal lobes of the developing delta evoluand small subserfal lobes (substantic changes that the delta substantial lobes (substantial the changes that the course
implify the cystem There is, small changes and
small subserfal lobes (substantial the changes ones
these processes changes in the same rails assistant
these processes changes a single particular ones
processes that the delta same distributation.

Essential southers with larger distributation.

Essential southers and differential haplest willian
eccupying the delta and differential haplest willian
too by these spaces has shown that the late and

pattern of channel and island formation and the processes responsible for the system simplification such as described above are primary factors determing the spectua found in the delta. These flow and sadimentary dynamics move the tore complex portion of the delta Culfuard and are believed to be more important than such factors as alroration of the salinity regime in community wake-up.
Understanding the coupling between these geological and biological dynamics has important implications in the future attempts to manage Louisiana's coastal resources through such techniques as shoreline stabilization and freshwater diversion.

Physical Perspective of Water, Sediment, and Nutrient Dynamics for the Lover Atchaiclaya River

F. C. Wang (Coastal Ecology Laboratory, Conter for Weiland Resources, Louisians State University, Baton Rouge, La. 70803)

The Atchafalaya River, the major distributery of the Hississippi River, represents a significant course change for the largest river on the North American continent. The associated conregence of the Atchafalaya Delta in south-central Louisians is one of the most notworthy geological events of the century. Our research program is concentrated on the lower atchafalaya River Delta system. Several projects are designed to address various management lasues, including the potentials for (1) increased fleeding due to the prograding course, (2) creating new wetlands, and (3) anhancing the productivity of natural marshes and their associated resources. Physical factors affecting the evolution of the Atchafalaya River Delta are riverine inflow, assissent, and nutrient inputs from the lower Atchafalaya River; these factors also influence adjacent wetlands and the negrators cane of the Gulf of Mexico.

Impacts of natural changes and husan activities in these grams are being studied through various projects, such as the effects of the Avoca Island leves attention on match flooding. Computer significant entitle the service of the avoca Island leves attention on the wetland hydrology in Measurn Terrebons Parish Marsh is being used to compete the influence of prevating weather patterns on merch flooding before and after the leves actention.

Terrebone Parish Hersh is being used to compare the influence of prevailing weather parterns on mersh flooding before and after the leves extension. Resolts are obstained both qualitatively and quantitatively in terms of current velocities, steps hydrographs, and sediment distribution. Finid controling in the study area is used to aid in calibration of the computer model. A refined model is being constructed to simulate the real study area as clossly as possible. Purther field data collected will be used to verify the computer model.

## Vitrogen Dynamics in Fourlyagus Bay, Louisiana

C. J. Hodden, J. M. Day, Jr., K. G. Tengue, (Center for Notland Pseources, Louisiana State University, Baton Pouge, LA 7863) C. J. Smith, B. D. Delaums, and W. M. Patrick, Jr. (Laboratory for Watland Solis and Sediments, Louistana State University, Baton Bouge, La. 70803-7511)

Extramely high riverine inorganic nitrogen inputs to fourlesque Bay decrease non-conservatively along the salinity gradient. Average nitrat incontration of 60 with the upper satury decline to 19 in the lower saturation productivity rates amount of nitrace and amountum removed from

Strong accomplys flyes out of the meditents everaging 139 uW/m 'hr are shour 131-407 of riverina inputs of Din. Marser column caninaralization of amontum is a strong source of inorganic N to the system with rates as high as 350 uW/m 'hr, approximately squal to mean rates of riverine loading. The major pethway of nitrate loss from the system sprears to be through fluest loss from the system sprears to be through fluest loss from the system sprears to be through fluest loss from the system sprears to be through fluest to the benthic sedigents where we have neasured losses averaging 112 uW/m'/hr and ranging up to 1534 uW/m'/hr. Danitrification within the enoute sediments demons account for the high nitrate flux into the sediments flues to Sedimentation was decermined to be a major wink of nitrogen and was generally higher in the upper estuary.

sire ture is supplemented as required by specialized working opps and task groups. Approved objectives will be integrate into the Irilling program by the Planding Committee under the direction of the Irillips Executive Committee. JOIDES also is seeking persons with scientific or technic expertuse to serve on advisory panels for approximately 2 ye

experture to serve on advisory panels for approximately 2 yeterna,

Notines is an international organization made up of ten U,
academic institutions, and the science agencies of other member
academic which presently include Canada, France, the Feder
Republic of Germany, Japan, and the United Kingdom. Suppofor the Ocean Drilling Program is provided by the U.S. Nation
Science Foundation, the Department of Energy, Mines at
Resources of Canada, the Center Pallianal pour IEspotiation d
Océans of France, the Bundesanstalt für Geowissenschaften ut
Robstoffe of the Federal Republic of Germany, and the Natur
Environment Research Council of the United Kingdor
Participation in the Ocean Drilling Program and science advise
structure is open to anyone, and is not limited to representatival
JOHNES Institutions or member countries.

Nimbus 1 SMMP derived seasonal variations in the water vapor liquid water and surface winds over the global oceans C. PRABHAFARA (NASA/Goddard Space Flight Center. Greenhelt, Mo. 20771)

utthin the enotic sedipents cannot account for she high nitrace flux into the sediment, and was less than 153 of the average nitrace flux. Sedimentation was decermined to be a taign side of nitrogan and was generally higher in the upper entuary.

POCIER

Ocean Drilling Program - Joint Oceanograph (Oceanograph Institutions for Deep Barth Sampling (OIDES)

D. S. MARSZALEK

J. J. HONNORES (Both at NOIDES Office, Rosenstiel School of Marine and Aimaspheric Science, University of Milami, Milami, FL 3319)

The Ocean Drilling Program replaces the recently complete drilling phase of the Deep Sea Drilling Project (DSDP). A new or larger deep sea drilling vessel with expanded capabilities including a longer drill string, bare rock spud-in, enhanced logging and the potential for riser drilling will replace the DIV Glom Challenger. Orilling is acheduled in commence in late 1938 a planning for the initial three years of drilling is now underwas Suggestions for rilleng objectives, downhole experiments, et for all areas worldwide are now being solicited by JOIDES (10)

Suggestions for use of the driliship are reviewed by it IOIDES science advisory structure which includes three thomas and live regional panels and four service panels. The advisor interactions,

AND THE STATE BORISTATE VARIATIONS OF CALIFOLD BE FIRE THE STATE OF

FIR. 7-952- 17 (c) M. B. C. School III (c) and Ice Branch, discribelly 75 June 2011 (c) according to Branch, discribelly 75 June 2013, but control of the Control of Control of the Control of the Control of Control

extended significant differences, it maybe applies all the enter the course from any large requirements for even been applied to extend the course from the season in the season product declarity, the first three particles are the extended the course from the season in the course of the course of the enterthal three conferences in the limit of contents of the three conferences in the limit, the course of the limit of the course from the conference in the limit, the course for the course of the limit of the conference of the limit of the limit

"You see for incomprepays Symptotic States Country States Country States Country States Foot Symbols 5 Estip Data Andrew D. Carleton (Cooperative Institute for Resourch In Environmental Sciences, University of Colorado, Notice Colorado, Notice

in Environmental Sciences, University of Colorado, Douldor, Colorado, 20300).

Three case studios are used to evaluate the interactions between individual symoptic events and the sea ice cover of parts of the western Arctic during October 1976. Changes in ice conditions extent, concentration are assessed quantitatively using two-day averaged quicrowave data from Minbus-5 CSNP (Electrically Seamning Microwave Baddometer). These are related to delly 850cb resultant wind patterns for the meriods considered. It is found that the surface brightness temperature (Tg) changes involve variations in ice extent and concentration for wather systems resulting quasi-stationary on the corder of about a week. A strong anticyclone is associated with relatively static Tg and, hance, with generally stable ice conditions. There is evidence from ESNR of possible disergence/convergence of the marshore pack fice under conditions of sustained of fabore/onshore sirfiew. Conversely, a quasi-stationary cyclonic system produces marked Tg variations involving rapid changes in ice-adge position and fee concentrations. Consideration of the relationship between the geostrophic wind and the ice untion reveals, in this case, that the ice "advance" is only partly accounted for by the wind; naw ice growth to shown to be of cajor inportance.

"advance" is only partly accounted for by the vindi naw ice growth is shown to be of tajor inportance. Transfant attouchments (temperature, noisture) Fluctuations (e.g. inversions) associated with the peasage of more mobile eventual systems, appear to influence the microscave sea ice Tg signatures on short time scales. They are superimposed on the slover variations related to ice type or ice concentration. (Arishtman temperatures, ice advention).

variations related to the type w. ....(Brightness camperatures, ice advection). J. Geophys. Res., D. Paper 400:04

Particles and Fields—

Interplanetary Space

## Travel Funds to Spring Meeting Available to Foreign **Graduate Students**

Grants of up to \$250 are available to foreign graduate students studying in the U.S. for travel to the AGU Spring Meeting, May 14-18 in Cincinnati, Ohio.

Short-Term Enrichment Program (STEP) of the U.S. Information Agency, are available to full-time foreign graduate students who are not receiving ANY U.S. government funds. Students in refugee, immigrant or tourist visa status are not eligible.

For complete eligibility requirements and an application, write

Member Programs Department American Geophysical Union 2000 Florida Avenue, N.W. Washington, DC 20009 202/462-6903

> Deadline: April 30, 1984

**Separates** To Order: The order number can be found at the end of each abstract; use all digits when ordering. Only papers with order numbers are available from AGU. Cost: \$3.50 for the first article and \$1.00 for each additional article in the same order. Payment must accompany order. De-

> Send your order to: American Geophysical Union 2000 Florida Avenue, N.W. Washington, D.C. 20009

## Meteorology

posit accounts available.

3716 Chemical composition and chemical interactions
Suffur Dioxide in Romate Oceanic Air: Cloud Transport of
Reactive Procursors
Rebort B. Chalfold (National Center for Atmospheric
Research, Roulder, CO 80007, USA), Paul J. Crutzon
Reactive surface emissions of reduced suffur gasus can
produce SD<sub>2</sub> in the middle and upper troposphere at the levels of 8025 ppty measured high ever the remote oceans. No
pressant simulations with a two-dimensional "Staubasuger" or
vacuum-oleaner" model that combines a photochemical
model with a description of vertical transport of troce
species by convective chands within larger synoptic circuletions. Emissions of 20-80 Tg(8)/yr of (Cliphys Ha/S. or CS;
may produce the observed SO<sub>2</sub>. Roughly equal production
rates of SO<sub>2</sub> and mothems suffone acid may be expected.
The amount and exact vertical distribution of the SO<sub>2</sub> produced remain uncertain; the greatest charmosl uncertainties
are the reaction yield of SO<sub>2</sub> expectable under close tropspharic conditions and size the liquid-phase removal of SO<sub>2</sub>,
and the exidence is sources to regions of active convection.
However, the character of the solutions we present is invarishy distinctly different from those obtained with oneotic-dimensional models amploying the addy-diffusion
hypothesis.

obtained with one- or two-dimensional models employing the eddy-diffusion bypothesis.

The results of the model point beyond its original conception, and stress the likely importance of the rainy tropical longies and mid-initiagion industrial regions, since both regions have large suffer omissions and frequently active oursaininhous convection. This source, however, should contribute mainly to upper-tropospheric SO<sub>2</sub>. Other chemical implications are that tropospheric OH may depend critically on bydrogen perceide sevents as well as the hydrocarbon and nitrogen outde cycles. The hydroxyl radical concentration depends as much on assumptions regarding HOOH resolution and transport as it does on NO levels.

J. Caophys. Res., D. Paper 400378

## Geophys. Res., D, Paper 400377

Oceanography

4705 Boundary Layer and suchange processes
THE SEASONAL MARIATION OF THE MIXED LAYER AND THE PYCHOCLIME UNDER POLAR SEA ICE
P. Lewise (New-Planck-Institut für Neteorologie, Bundomstr. 55, 2000 Messburg 13, FRG1 and T. O. Manley
A model of the measonel waitation of the mixed layer
and the pychocilne undur polar sea ice in compared with
observations during the Arctic Ice Dynamics Joint Experimont (AIDJEN) 1975 - 1976. The model is of the YrausTurner type satended to include shard layer and pychoLine. The forcing machanisms are the sochanical claims
due to icu-keel stirring and the surface beopyancy flux
due to melting and freezing of sea ice. The model is
designed to be used for climats studies in conjunction
with atmospheric and oceanic CCN's and with sea Ice
models.

J. Geophys. Res., C, Paper 4C0298

A713 Circulation
A NOTE ON "MINSICAL OCEANOGRAPHY OF THE GULF OF MAINE"
BY HERRY B. BIGELOW (1927)
D. G. Hountais (Korchemen Fisheries Center, Moode Hole,
Massachuserts, 02543)
The circulation pattern proposed by Bigelow (1927)
The circulation pattern proposed by Bigelow (1927)

The circulation pattern proposed by Sigelow (1921) included a mijor current of water flowing southward off the southern side of Georges Bank. This pattern is not consistent with recent long-term current is not consistent with recent long-term current speakurements that show the water there moves weatward along the bank isoberhs. The bassurements made by Sigelow are reviewed to show that a Gulf Stream ring was longed south of the bank during his observations and that the ring was likely entraining water off of Georges Sauk, consistent with Sigelow's conclusions. (Circulation, Georges Bank, Ouif Stream rings).

J. Geophys. Res., C, Paper ACO418 Journal of Geophysical Research

Salo Coenie Rays

RADIAL GRADIERT OF COSHIC RAY INTERSITY FROM A

RADIAL GRADIERT OF DATA FROM VOYAGERS 1 AND 2 AND

IMP-6

Volume 89 Number D2 April 20, 1884

Triggered Lightning in New Mexico (Paper 3D1931)

P. Ilubert, P. Laroche, A. Eybert-Berard, and L. Barnet

Josef R. Parrington and William II. Zoiter

Surface Chloride Salt Formation on Space Shuttle Exhaust Alumins (Paper 3D1859)

Effects of Stratospheric Aerosol on Measured Short-Wave Radialion Incident at the Ground (Paper 3D1993)

Deep PC Isothermal Layers Within Precipitation Bands Over Southern Ontario (Paper 3D1811)

Ranged the Schumson-Runge Bands (Paper 3D1851)

J. P. Naindet, P. Rigand, and D. Ungeria.

Bayestan Probability Calculations in the Southern Hemisphere From Super Pressure Balloon

Trajectories (Paper 3D1830)

J. P. Naindet, P. Rigand, and L. R. Megill

J. P. Naindet, P. Rigand, and L. R. Megill

J. P. Naindet, P. Rigand, and L. R. Megill

J. P. Naindet, P. Rigand, and L. R. Megill

J. P. Naindet, P. Rigand, and L. R. Megill

J. P. Naindet, P. Rigand, and L. R. Megill

John J. Olivero, A. W. Ship, P. R. Williampan, and L. R. Megill

A Variational Formulation for Time-Dependent Climate Models (Paper 4D0985)

Variational Formulation for Well-Established Weather Phenomenon (Paper 1D1960)

Variation of Utilizations of the Squarer and Lagery, Calapary, Albertas, Camado), 8. B. Backer and 5. R. Restaction of S. R. Restaction of S. R. Restaction of Calculations of the Special Statistics of Calculations of Physics and Utilization of Calculations of Calculations of the Special Statistics of the Schumson-Runge Bands (Paper 3D1930)

J. P. Naindet, P. Rigand, and D. Illingunian for head of the Schumson for Special Statistics of the Schumson for Sp Possible Solar Signature on a Well-Established Weather Phenomenon (Paper 3D(950)

Correcting Satellite Doppier Data for Tropospheric Effects (Paper 3D1948)

Records of Atmospherics at 10 kHz During a Tropical Cyclone (Paper 3D1770)

R. Bhattacharya and A. B. Bhattacharya

R. Bhattacharya and A. B. Bhattacharya

Raiph Markson

Raiph Markson

Rely and Signature on a Well-Established Weather Phenomenon (Paper 3D1950)

Vasilis P. Tritabls

1609

160 4 12/deg, obtained from the particular actions of the behaves rycager 1 and the paper 3to in Latitude behaves rycager 1 and the separation in Latitude abuses rycager 1 and the separation in Latitud

Robert H. Holzworth 2637 J. Gdophyo. Rose. A. Paper 40509

## Particles and Fields-Magnetosphere

5715 Electric fields
1986 I AND 2 OBSERVATIONS OF AN USCILLATING OUTWARD
MOVING CORRENT SHEET MEAR HIDMIGHT
T. J. Fully (Identitue of Geophysics and Planetary
Physics, Oniversity of California, Los Angelos, (A
90024). C. T. Russeli and R. J. Valbar
An outward moving current shoot is oxamided with the
1986 I and 2 magnetometers. It is lound that the
current shoot is nowing outwards with a velocity of
about 17 km/sec, a thickness of about 1900 km, and with
the current flowing into the ionusphere. Outsitations
observed in the magnetic field profile indicate the
presence of a wave travalling along the current sheat
from midsight towards the oast with a velocity of 400
km/sec. The oacillations of the place normal to the
current sheat associated with this wave are sufficient
to explain the wapitude of the ribution isled outlibutions in the plane of the current sheat associated with this wave are sufficient
to explain the applitude of the ribution isled outlibution a strong
electric field is observed normal to the sheat, curresponding to a flow along the sheat of 400 km/sec, which
as consistent with the velocity of the wave deduced
from the intermatellite timing of the overlintions.
Thus the wave is stantonery in the frame of the current
sheat plasma. This oscillating current sheat wave way beautions. The potential drop across
the current sheat was very large at this time, 41:26
kV, and is comparable to the total normal potential
drop across the polar cap. (Field-milgned currents,
electric fields, F1.2, subscorus).
J. Geophys. Res., A, Fsper AAD22J

J. Geophys. Res., A, Paper 4A0223

5736 Magnetic tall FAST MOVING PLASMA STRUCTURES IN THE DISTANT

9736 Magnetic tail
FAST MOVING PLASMA STRUCTUPES IN THE DISTANT MAINTIOTAIL
M. Scholer (Mas-Planck-Institut für extraterestrische Physik, 8046 Garching), G. Gloeckier, B. Klecker, F.M. Ipavich, D. Hovestadt and E.J. Smith
We report in this paper for the first time the detailed time behaviour of the intensities and the angular distributions of energetic protons and electrons in the distant magnetotal of the serih at ~270 Rg and ~110 Fg. The data have been obtained by the Mas-Planck-Institut/University of Maryland sensor system on ISEE-3 during the spacecaft's first deep tail passage. Three energetic particle bursts are studied in detail. At the beginning of these bursts we first observe streaming electrons at an energy of 73-113 keV. These are followed after several minutes by anisotropic protons. The protons eviloit an energy dispersion with higher energy protons (~120 keV) spearing before lower energy (~32 keV) protons. In two of the three cases the streaming electron distributions are followed after 8-15 min by an isotropic electron distribution. At the rear side of the bursts the time dispersion effects are not seen in reverse order. Also no gradient anisotropy effects are observed in the beginning of the proton attreaming. We suggest that the satellite encounters detached plasma structures, probably plasmoids, move with high velocities (~200 km/s) down the fall. The energetic electrons are protone stream ahead of these fast tails and moving plasma structures, what leads to the various time dispersion effects. This allows, in principle, a determination of the source distance from the satellitie.

J. Geophys. Eex., A, Paper 4A0454

5755 Plasma instabilities
DIRECT GRABATION OF THE AUDORAL KILOMETRIC
RADIATION BY THE MASE! SYNCHICTRON INSTABILITY
PHYSICAL MECHANISM AND PARAMETRIC STILDY
D. Le Queau and R. Pellat (Centre de Physique Théorique,
Cole Polytechnique, 91128 Pafaiscau-Cedes, France),
A. Roux (Centre de Rocherches en Physique de l'Environnament, CNET, 9213 Issyl-en-Moulineaux, France).
Recent observations at low altitudes made in the source
region of the auroral kilometric rudiation (AKR here insider)
strongly support the major synchrotran invitability (M51)
as the relevant generation process for the AKR. This was
liest realized by Wu and Lee (1979). In a recent work Le Quidui
et al. (1983) hereinnifier called reference 1) we have proposed
an analytical treatment of the M51. The present work is
a continuation of this ambifutual study. First we investigate
the physical process of the AFS, and sumple analytical
expressions, valid for any distribution functions of nonthermal
electrons are given. It is shown that supraliminous X mode
waves (Micc. So. 1) can resonate with relatively law energy
electroms prayled that the cold plusma paramoters, E.

La floy, is much smaller than unity, the proper indice
the X mode and nonthermal electrons moves at a parallel
velocity k, c. A., Resonance curves are then circles centered around this value and electrons them proper indice
tonstain parallel velocities. The difference between the
M51 and the atfactard cyclotron theory (where tessonance
curves are straight lines while diffusion curves are circles
centered around saffe...) is suressed. A parametric study of
the Instability conditions for such supralimnous wave
is conducted. We investigate the role played by 9, the propagatum sigle E., the instrument of between the distribution used are circles
in the care of the shirted loss come distribution used here,
u is amply, its parallel bulk velocity. Largest growth ratéare obtained for k, c. A. Papor 2A1759